DOCUMENT RESUME

ED 024 350 24 HE 000 192

By- Thistlethwaite, Donald L.
The Effects of College Environments on Students' Decisions to Attend Graduate School. Final Report.
Vanderbilt Univ., Nashville, Tenn.
Spons Agency- Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No- BR-5-0903
Pub Date Sep 68
Contract- OEC-6-10-017
Note- 180p.
EDRS Price MF-$0.75 HC-$9.10
Descriptors- *Academic Aspiration, Attitudes, *Environmental Influences, *Graduate Study, *Higher Education, Institutional Environment, Peer Groups, Professional Education, *Students, Values

The effects of college environments upon students' attitudes toward pursuing advanced graduate or professional study were investigated. The subjects were 1,178 member of the class of 1963 enrolled in 50 colleges and universities. Survey responses to a standard set of 23 scales were obtained at the completion of the sophomore, junior and senior years. The procedures provided means of studying (1) the relationship of perceived college environments to aspirations and values of students entering a major field (2) the degree to which aspirations and values changed concomitantly with changes in perceived values and expectations of teachers and peers (3) the effect of college environment and experiences upon decisions to enter graduate school immediately after graduation. Tests confirmed the hypotheses that the desire to pursue graduate study was strengthened by the achievement of good rapport with faculty during senior year, by experiencing pressure from peers for advanced study, by talking with faculty, students and parents about graduate study, winning recognition for academic achievements, and participation in research. Most of the results indicate that the examples of teachers and peers persuade many undergraduates that advanced training is an appropriate goal. Alternative methods of controlling errors of measurement in assessing initial status are discussed, and different criteria for assessing impacts of college environment upon student attitudes are evaluated. (Author/JS)

BR 5-0903
PA-24

ED0 24

FINAL REPORT

Project No. 2993

Contract No. OE-6-10-017

THE EFFECTS OF COLLEGE ENVIRONMENTS ON STUDENTS' DECISIONS TO ATTEND GRADUATE SCHOOL

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

September, 1968

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

HE000 192

Final Report

Project No. 2993
Contract No. OE-6-10-017

THE EFFECTS OF COLLEGE ENVIRONMENTS ON STUDENTS' DECISIONS TO ATTEND GRADUATE SCHOOL

Donald L. Thistlethwaite

Vanderbilt University

Nashville, Tennessee

September, 1968

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

CONTENTS

Page

ACKNOWLEDGMENTS vii

SUMMARY 1

CHAPTER I - INTRODUCTION 3

Related Studies 3

Organization of this Report 4

CHAPTER II - METHOD 6

Sample 6

Survey Materials 11

CHAPTER III - SOME EFFECTS OF ENTERING A FIELD OF STUDY 24

The Opportunity and Problem of Quasi-Experimental Comparisons 24

Treatment Groups 25

Ecological Effects of Entering a Field of Study 26

Alternative Methods of Assessing Effects 33

Field Effects upon Student Aspirations and Values 40

Are there Plausible Rival Explanations of the Results? 42

Conclusions 45

CHAPTER IV - CHANGES IN STUDENTS AND IN COLLEGE ENVIRONMENTS 46

Changes in Variabilities in Student and College Measures 48

Changes in Average Levels on Student and College Measures ... 54

Conclusions 62

CHAPTER V - COLLEGE EXPERIENCES AND CHANGES IN DISPOSITIONS TO SEEK ADVANCED TRAINING 64

Effects of College Press upon Changes in Dispositions 64

Effects of Other College Experiences upon Changes in Dispositions 74

Conclusions 78

CONTENTS--Continued

Page

CHAPTER VI - CONCLUSIONS 80

Problems of Methodology 80

Theoretical Interpretations of the Results 81

Recommendations 83

REFERENCES 85

APPENDIX A 90

APPENDIX B 92

APPENDIX C 119

APPENDIX D 127

APPENDIX E 139

APPENDIX F 141

ERIC REPORT RESUME 147

LIST OF TABLES

TABLE

1 Comparison of 1964 Opening Enrollments in Higher Education with Characteristics of Designated and Analyzed Samples of Respondents 7

2 Returns to Surveys in 1965, 1966, and 1967 8

3 Subject Loss Associated with Sex and Reported Rank in High School Class 9

4 Subject Loss Associated with Undergraduate Grade Point Average Reported at End of Sophomore Year 10

5 Subject Loss Associated with 1965 Plans to Seek Advanced Training 11

6 Subject Loss Associated with Reported Characteristics of Respondent's Parents 12

CONTENTS--Continued

TABLE Page

7 Factor Pattern Coefficients for Items in Faculty Press Scales 15

8 Factor Pattern Coefficients for Items in Student Press Scales 17

9 Factor Structure of College Press Scale Scores Obtained at Completion of Sophomore, Junior, and Senior Years in College 18-19

10 Product-Moment Correlations Between Scores of 1,178 Students on Faculty Supportiveness and Faculty Press for Affiliation Scales 19

11 Table of Intercorrelations of Oblique Factors Extracted in Factor Analysis of College Press Scale Scores 21

12 Respondent's Statements Concerning Faculty Members and Student Peers Described on College Press Scales 23

13 Adjusted Mean Scores on Faculty Press Scales of 655 Men in 14 Fields of Study 28

14 Adjusted Mean Scores on Selected Faculty Press Scales of 523 Women in 11 Fields of Study 29

15 Adjusted Mean Scores on Selected Faculty and Student Press Scales of 523 Women in 11 Fields of Study 30

16 Adjusted Mean Scores on Student Press Scales of 655 Men in 14 Fields of Study 31

17 Comparisons of Covariance Analyses Using as the Covariable Fallible and True Pretest Scores of 655 Men in 14 Fields .. 34

18 Comparisons of Covariance Analyses Using as the Covariable Fallible and True Pretest Scores of 523 Women in 11 Fields. 36

19 Comparisons of Adjusted Mean Value Scores for Treatment Pairs in which Covariance Analysis is Non-Spurious (Men)... 43

20 Comparisons of Adjusted Mean Value Scores for Treatment Pairs in which Covariance Analysis is Non-Spurious (Women). 44

21 Comparisons between Alternative Criteria of Causal Effects. 49

22 Changes in Variability of College Press Scores of Men and Women 52

CONTENTS--Continued

TABLE Page

23 Changes in Aspirations and Related Attitudes During the College Years 55

24 Changes in Average Value Scores of Men and Women 56

25 Changes in Average College Press Scores of Men and Women .. 58

26 Correlations between Predicted and Obtained Criterion Measures 66

27 Estimates of Reliabilities of Weighted Composite Scores for Predicting Criteria 67

28 Partial Correlations between College Press Scores and Criterion Scores Using Different Corrections for Attenuation 69

29 Partial Correlations between College Press Scores and Criterion Scores for Men and Women 72

30 Partial Correlations between Criterion Scores and Talking with Others About Graduate School 75

31 Partial Correlations between Criterion Scores and Academic Achievements in College 77

Appendix Tables

APPENDIX

A-1 Colleges and Universities Attended by Respondents to 1965 Survey 90

C-1 Scales and Items Included in Faculty and Student Press Scales 119

C-2 Estimated Reliabilities of College Press Scale Scores Obtained on Each Survey 126

D-1 Comparisons of Adjusted Means Obtained from Conventional and True-Score Covariance Analyses on Faculty Press for Science Scores (Men) 136

D-2 Comparisons of Adjusted Means Obtained from Conventional and True-Score Covariance Analyses on Student Press for Vocationalism Scores (Men) 138

E-1 Weights Used in Deriving Predicted Criterion Scores 139

CONTENTS--Continued

Page

APPENDIX

F-1 Partial Correlations between College Press Scores and Criterion Scores Holding Constant Different Numbers of Predictors (Men) 143

F-2 Partial Correlations between College Press Scores and Criterion Scores Holding Constant Different Numbers of Predictors (Women) 145

LIST OF FIGURES

FIGURE

1 Hypothetical Outcomes of Fallible and True-Score Covariance Analysis of Scores for Three Treatment Groups.. 39

2 Hypothetical Differences between Treatment Groups on Pretest and Posttest Measures 47

3 Increases Exhibited by Men in Faculty Rapport Scale Scores During Upperclass Years in College 60

4 Increases Exhibited by Women in Faculty Rapport Scale Scores During Upperclass Years in College 61

Appendix Figures

APPENDIX

D-1 Covariance Adjustments in Cases with an Increase or Decrease in the Treatment-Outcome Correlation 128

D-2 Covariance Adjustments in Cases Where Internal Regression Slopes Exceed External Regression Slopes 131

D-3 Covariance Analysis in Cases Having Negative Internal Regressions and Positive or Negative External Regressions. 133

D-4 Contrasts between the Internal Regression Slope and Selected Paired-Treatment Slopes 135

ACKNOWLEDGEMENTS

The author is indebted most of all to the many college students who indefatigably served as panel members in this study. The help of numerous college administrators in authorizing the survey of their students and in providing college directories is gratefully acknowledged. The author benefited greatly from the papers, advice, and comments of Donald T. Campbell, Richard L. Gorsuch, Frederic M. Lord, Jum C. Nunnally, and of Julian C. Stanley. He is also grateful to Charles F. Behling, Melvin F. Evarts, James P. Flanders, Carol S. Huffman, and Norman E. Wheeler who served as research assistants at various stages of the project. Finally, the author is grateful to Sue Clark who typed numerous drafts and helped in the production of this report.

SUMMARY

This research was concerned with assessing the effects of college environments upon student attitudes toward pursuing advanced graduate or professional study. Subjects were selected from college directories at 50 colleges and universities, and approximately 1,200 panel members in the entering college class of 1963 provided survey responses at the completion of their sophomore, junior, and senior years of undergraduate study. A standard set of 23 scales, administered on each occasion, was used to assess the characteristics of faculty members and students the respondents knew best during the preceding year. The procedures provided the means of studying (a) the effects upon perceived college environments and upon student aspirations and values of entering a major field of study, (b) the degree to which the aspirations and values of students changed concomitantly with the perceived values and expectations of teachers and peers, and (c) the effects of college environments and experiences upon decisions to seek advanced training. In addition, the data were useful in evaluating alternative methods of analyzing the impacts of college environments upon students.

The most striking effects of entering a major field of study were upon the kinds of teacher and peer subcultures respondents reportedly experienced. The results confirm in part the development of two "cultures"--scientific and humanistic--which many observers have described. Students in these two cultures not only described the teachers they knew best in markedly different terms; they also described their close undergraduate friends very differently. Entry into the physical sciences produced increases in faculty and student press for science and for advanced training, while entry into the humanities produced increases in faculty press for humanities and in student press for estheticism. There was no evidence that entering a field of study had effects upon aspirations to seek advanced training, but entry into some major fields of study produced effects upon the student's values, particularly upon his prosocial, affluence, intellectual, and individualistic values.

During the last two years of college, panel members exhibited marked increments in degree aspirations, and also exhibited concomitant changes in faculty and student press and in student values. At the completion of the sophomore year, 63 per cent of the women and 82 per cent of the men planned at least some graduate study, while at the completion of the senior year 88 per cent of the women and 92 per cent of the men reported such plans. During the same period, student descriptions of their college environments indicated that there were large increments in faculty affiliation, supportiveness, regard for the respondent's ability, and press for advanced training and independent thinking. There were parallel increases in reported student press for advanced training, and in the percentage of panel members reporting that their close friends planned to pursue graduate study. On the average, both men and women exhibited increases in individualistic, and decreases in prosocial, value orientations. Most of the results are congruent with the

hypothesis that teachers and peers provide modeling stimuli, which persuade many undergraduates that advanced graduate or professional training is an appropriate goal.

Although 9 out of every 10 of the panel members said at the completion of college that they planned to do at least some graduate study, only 28 per cent of the women and 57 per cent of the men entered graduate or professional school immediately. Hypotheses concerning the impacts of college upon decisions to pursue graduate study were evaluated by partial correlations which held constant initial dispositions to seek advanced training. These tests confirmed the hypotheses that desire to pursue graduate study was strengthened by (a) achieving good rapport with college teachers during the senior year, (b) exposure to peers exerting press for advanced training, (c) talking with faculty members, students, and parents about plans for graduate study, (d) winning recognition for academic achievement in college, and (e) undergraduate research participation.

The research suggests the following conclusions concerning different methodologies for studying the impacts of college upon students. First, in analyzing data from quasi-experiments a method of analysis which controls errors of measurement of initial status is highly desirable. In most cases, the method of first choice entails estimates of the reliabilities of pretest measures, and analysis of covariance using estimated true scores on the pretest as the covariate. Second, while conventional covariance analysis methods generally yield inflated significance levels in assessing treatment effects, these methods are generally superior to two other criteria that have been proposed for assessing such effects (increment in treatment-outcome correlation and increment in pooled variance). Third, it is shown that it is possible to define conditions under which measurement errors on a covariable can be ruled out as an explanation for observed differences between adjusted means yielded by conventional covariance analysis. Finally, it was shown that partial correlation techniques for assessing causal effects are more robust than has generally been supposed. Overall, this research provided a basis for optimism that the classical measurement problems associated with the research literature on the impacts of colleges upon students may not be insoluble.

CHAPTER I

INTRODUCTION

The purpose of this project was to identify types of faculty and peer subcultures which facilitate or impede development of motivation to seek advanced graduate or professional study. Reviews of the literature related to this topic have recently been presented by Newcomb and Feldman (33) and by Thistlethwaite (52), and a brief sketch of the most salient features of this literature will suffice for the purpose of introducing the major topics to be considered. More extensive discussions of the most relevant studies are found in the chapters which follow.

Related Studies

Research aimed at identifying college environments which are unusually effective in stimulating the achievement motivation of undergraduates dates from about 1930 when the early studies by Prentice and Kunkel (37, 38) appeared. These studies were the first examples of a mode of analysis which has subsequently come to be called a "college productivity" analysis. In this mode of analysis undergraduate colleges and universities are regarded as the population to be sampled, and an attempt is made to describe the characteristics of institutions which are unusually "high" or "low" with respect to their output of students (graduates) who later obtain advanced degrees or other types of scholarly recognition. Perhaps the best-known study in this tradition is that by Knapp and Goodrich (25) in which colleges were compared with respect to their outputs of alumni who later earned the Ph.D. degree. Other investigators who have reported studies conforming to this paradigm include: Astin (2, 3, 7), Astin and Panos (8), Kunkel (27), Kunkel and Prentice (28), Nichols (34), Skager, Holland, and Braskamp (41), Thistlethwaite (45, 46), Traxler (54), and Visher (55). By far the most frequently expressed methodological percept found in recent college productivity studies is the necessity of controlling differences in student quality among institutions so that comparisons of colleges on the basis of the attainments of their graduates will not merely reflect diversities in entering classes. Recently, Richards (39) and Newcomb and Feldman (33) have expressed reservations that many of the current techniques for partialing out the effects of input characteristics may partial out too much (e.g., by partialing out the joint effects of college and student input characteristics).

A second frequently used mode of analysis, which may be called an "analysis to find out who changes," regards the population of college students as the population to be sampled, and correlates individual differences with respect to changes in aspirations or attitudes with actual or reported exposures to various types of college environments. Investigators reporting studies conforming to this paradigm include: Astin (4, 5, 6), Gurin and Katz (21), Thistlethwaite (47, 48, 49, 50, 51, 52), Thistlethwaite and Wheeler (53), and Wallace (56). The chief weakness of the latter studies has been the fact that errors of measurement on the measures of initial status have been largely ignored. Lord (29) and

Bereiter (9) have pointed out that estimates of true scores on measures of initial status may be required in order to make the appropriate adjustments for initial differences between individuals.

Although many of the methodological problems illustrated in this research literature have appeared insurmountable to some observers (9, 32), a number of recent developments suggest that the problems may not be insoluble. First, Campbell and Stanley (13) have recently summarized a variety of quasi-experimental designs that may be useful in identifying causal relationships in studies of college effects. Second, Lord (30) and Porter (36) have suggested modifications in conventional techniques of statistical analysis which permit the control of errors of measurement on variables indicative of initial status. Finally, Porter (36, pp. 16-29) has recently reviewed some of the mathematical literature relevant to the use of variables subject to error. Porter observes that the first mention of the inappropriateness of least-squares estimates of the structural relation between two variables, when the variables are fallible, was made in 1878 by R. J. Adcock (1), and that since that time a considerable body of literature on the topic has accumulated. As social scientists become more familiar with this literature it seems likely that new solutions for old problems may be found.

Organization of this Report

This report is a summary of a longitudinal study of a panel of students enrolled in 50 colleges and universities. Panel members were surveyed by mail questionnaires on three occasions: during the summers following the sophomore, junior, and senior years. By repeated measures of the aspirations and attitudes of panel members, and concomitant measures on a fixed battery of college press scales, it was possible to study the development, and determinants, of the disposition to seek advanced training. The study attempted to take seriously the biases that may be introduced by the use of fallible measures, and included a number of methodological analyses designed to clarify the interpretation of results.

In Chapter II we shall describe the procedures used to select the panel of college students, to determine the factors associated with loss of panel members, and to evaluate the characteristics of the scales used to assess college environments.

Quasi-experimental tests of the effects of entering a specialized field of study are described in Chapter III. This chapter also includes a comparison of alternative criteria for assessing causal effects in quasi-experiments.

Chapter IV considers the changes exhibited by panel members as they progressed through college, regardless of whether all such changes can be construed as consequences of exposure to college. In addition, this chapter discusses the validity of change in the variabilities of dependent variables as an indicant of causal effects.

In Chapter V we consider college experiences and ecological changes during college, more or less common to different specialized fields of study, that may affect student dispositions to seek advanced training. In addition, comparisons are reported relevant to evaluating the robustness of partial correlation techniques in assessing college effects.

Finally, Chapter VI discusses the implications of the results, and presents conclusions and recommendations.[1]

---

[1] Appendix F summarizes a number of respects in which the final analysis of data differed from the analysis originally proposed, and briefly describes the reasons for departing from the initial plan.

CHAPTER II

METHOD

In this chapter descriptions of two major aspects of the data-collection and analysis procedures are presented: first, procedures used in selecting the panel of college students are described, together with the results of analyses designed to identify factors associated with subject loss in the designated sample of subjects; second, the survey materials are described, together with analyses of the statistical and factorial properties of the college press scales used to assess college environments. Descriptions of other major types of analyses used to study the effects of college environments upon student plans are presented in subsequent chapters in the sections in which the results yielded by each mode of analysis are discussed.

Sample

Selection of students. In Spring, 1965, letters were sent to 109 four-year colleges and universities requesting (a) permission to survey 100 of the institution's students who had sophomore standing during the academic year, 1964-65, and (b) a copy of the institution's published student directory containing student names, class standings, and home addresses. Only two institutions refused to participate in the study, although a much larger number reported they did not have student directories with the desired characteristics. Three institutions volunteered, and in fact furnished, the desired information from their files. The first 50 institutions providing a suitable directory or listing and meeting the desired distribution characteristics were selected.[1] At each of these schools a random sample of 100 names was selected from those listed for students having sophomore standing.

Table 1 compares characteristics of the designated sample of 5,000 students with characteristics of the opening enrollments in Fall, 1964 for all students enrolled in American colleges and universities. It can be seen that the designated sample was similar to the larger population with respect to type of control (public vs. private), type of institution, and geographical region, of the institution attended.

Mail surveys. Three mail questionnaires were sent in successive years to each panel member. The first mail questionnaires were sent in mid-August, 1965, to the 5,000 selected students. During the next two successive summers annual follow-up questionnaires were sent to each respondent who had remained in progression with the entering college class of 1963 and who had returned a useable questionnaire to the immediately preceding mail survey. On each survey, a reminder was sent in the form of a post-card or an additional copy of the relevant survey questionnaire to each person who had not replied to the mailing within

---

[1] Table A-1 in Appendix A lists the 50 institutions included.

TABLE 1

Comparison of 1964 Opening Enrollments in Higher Education with Characteristics of Designated and Analyzed Samples of Respondents

Characteristic	Percentage of all students attending institution with given characteristic	Percentage of students in sample attending institution with given characteristic[a]		A.S. as a % of D.S.
		D.S.	A.S.	
Control:				
Public control	60.5[b]	58.0	46.4	18.9
Private control	39.5	42.0	53.6	30.0
Type:				
University	49.3[b]	56.0	51.4	21.6
Liberal arts college	32.7	36.0	40.9	26.8
Teachers colleges	11.5	8.0	7.7	22.7
Others	6.5	----	----	----
Geographical region:				
New England and Mideast	26.6[c]	22.0	29.5	31.5
Great Lakes and Plains	27.4	28.0	25.6	21.6
Southeast and Southwest	23.7	22.0	18.2	19.5
Rocky Mountain and Far West	21.4	28.0	26.7	22.4
Others	.9	----	----	----

[a] D. S. refers to the designated sample of 5,000 at 50 institutions, while A. S. refer to the sample of 1,178 students in the final panel, classified by institution at the beginning of the study.

[b] Based only upon enrollments in four-year institutions.

[c] Based upon enrollments in both two-year and four-year institutions.

the first four weeks. Only panel members who returned useable questionnaires to each of the three surveys and who reported they would complete all the requirements for the bachelor's degree by September, 1967 were included in the analyzed sample. There were 655 men and 523 women meeting the latter requirements.

Survey returns. Returns to each of the three surveys are summarized in Table 2. It can be seen that the percentages of nonrespondents were 41.5, 16.2 and 9.6 in 1965, 1966, and 1967 respectively. On the other hand, the percentages in category B, which consisted mainly of students out of progression with their college class, progressively increased over the three years: 5.9, 8.9, and 20.8. Thus, on the first and second surveys the most important source of subject loss was nonresponse, while on the last survey the most important source of subject loss was withdrawal from college or delay in completing college work. In interpreting the data on subject loss the reader is cautioned not to assume that a low ratio of analyzed to designated subjects necessarily reflects a poor response rate. Low ratios may reflect poor response rate, high withdrawal rates from entering college class, or both. Factors associated with "subject loss" are described below, and these factors may or may not be associated with response biases.

TABLE 2

Returns to Surveys in 1965, 1966, and 1967

	Survey					
	1965		1966		1967	
Response Status	N	%	N	%	N	%
A. Respondent (returning useable questionnaire and remaining "in progression" with class)	2,329	46.6	1,718	73.8	1,178	68.6
B. Respondent (returning unuseable questionnaire: e.g. respondent withdrew from college, did not remain in progression with class, or returned incomplete questionnaire).	295	5.9	207	8.9	358	20.8
C. Untraceable (questionnaire returned with no forwarding address).	300	6.0	26	1.1	17	1.0
D. Non-respondent	2,076	41.5	378	16.2	165	9.6
Totals	5,000	100.0	2,329	100.0	1,718	100.0

Subject loss. The last column of Table 1, which expresses the final analyzed sample as a percentage of the designated sample for categories used in selecting students, shows that subject loss was greatest among students (a) attending publicly-controlled institutions, (b) attending universities and teachers colleges, and (c) from the Southeast and Southwest geographical regions.

For the remaining analyses of subject loss, separate analyses were performed for 1966 and 1967 surveys. Factors associated with subject loss were generally similar for the two surveys.

Subject loss was slightly greater among men than women, especially on the last survey (Table 3), but even on the latter the difference in the percentages was less than 4 percent. For both sexes, retention of subjects in the panel on each of the two surveys was better for subjects who reported relatively higher ranks in high school graduating classes.

TABLE 3

Subject Loss Associated with Sex and Reported Rank in High School Class

Reported rank in high school class	Men[a]			Women[a]		
	D.S.	A.S.	A.S. as % of D.S.	D.S.	A.S.	A.S. as % of D.S.
I. 1966 Survey						
Upper 5 percent	311	252	81.0	319	255	79.9
Upper 10 percent	268	189	70.5	254	190	74.8
Upper 25 percent	353	255	72.2	234	176	75.2
Upper 50 percent	224	161	71.9	109	71	65.1
Lower 50 percent	97	66	68.0	16	10	62.5
Don't know or no response	77	55	71.4	67	38	56.7
Total	1,330	978	73.5	999	740	74.1
II. 1967 Survey						
Upper 5 percent	252	197	78.2	255	199	78.0
Upper 10 percent	189	124	65.6	190	131	68.9
Upper 25 percent	255	164	64.3	176	126	71.6
Upper 50 percent	161	92	57.1	71	47	66.2
Lower 50 percent	66	39	59.1	10	5	50.0
Don't know or no response	55	39	70.9	38	15	39.5
Total	978	655	67.0	740	523	70.7

[a] D. S. refers to the designated sample, and A. S. to the analyzed sample, for the given survey.

Table 4 shows that undergraduate grade point average, as reported at the end of the sophomore year, was related to subject loss: students with higher grade point averages were more likely to be retained in the panel on each of the later occasions (Table 4). Similarly, the higher the student's degree aspirations in 1965 the less likely it was that he would be eliminated from the panel as a consequence of the outcomes on the later surveys (Table 5).

TABLE 4

Subject Loss Associated with Undergraduate Grade Point Average Reported at End of Sophomore Year

Letter grade reported closest to grade average	1966 Survey[a]			1967 Survey		
	D.S.	A.S.	A.S. as % of D.S.	D.S.	A.S.	A.S. as % of D.S.
A or A-	129	108	83.7	108	93	86.1
B+						
B	983	727	74.0	727	547	75.2
B-						
C+	1,010	741	73.4	741	466	62.9
C						
C- or lower	139	90	64.7	90	36	40.0
No equivalent or no response	68	52	76.5	52	36	69.2
Totals	2,329	1,718	73.8	1,718	1,178	68.6

[a] See footnote a, Table 3

Finally, Table 6 summarizes subject loss as a function of estimated family income and of reported education of the respondent's mother and father. There was a negative relation with family income: somewhat greater subject loss occurred on each survey among subjects who reported relatively high family incomes in 1965. Generally, relationships between subject loss and amounts of education of the respondent's mother or father were nonlinear or showed no marked trend.

Implications of subject loss for objectives of the study. Some of the factors associated with subject loss in the designated sample of subjects presumably had the effect of increasing the likelihood that the final panel of subjects would be disposed to seek advanced graduate or professional training. Certainly, this should be the consequence of greater subject retention among students ranking high in their high school graduating classes, having higher undergraduate grade point averages, and having mid-college plans and aspirations to earn advanced graduate or professional degrees. Such differential subject loss may restrict somewhat the populational generality of the results. However,

TABLE 5

Subject Loss Associated with 1965 Plans to Seek Advanced Training

Response in Summer, 1965 to: "What are your educational plans for the future? (Check the highest level of education you expect to complete)."	1966 Survey[a]			1967 Survey		
	D.S.	A.S.	A.S. as % of D.S.	D.S.	A.S.	A.S. as % of D.S.
At least 3 years of college or Bachelor's degree	689	501	72.7	501	312	62.3
Some graduate study or Master's degree	1,064	786	73.9	786	544	69.2
Professional degree (M.D., etc.) or academic doctorate (Ph.D.)	562	421	74.9	421	317	75.3
No response	14	10	71.4	10	5	50.0
Totals	2,329	1,718	73.8	1,718	1,178	68.6

[a] See footnote a, Table 3.

the type of subject loss observed may reflect to a great extent the very kind of mortality occurring in most college classes from the time of initial entry to the time of graduation. In other words, most colleges would probably have somewhat better retention among enrollees with high ranks in high school graduating class, high college grade point averages, and high initial degree aspirations. In any case, the purpose of the study was mainly to investigate factors influencing plans to seek advanced graduate or professional training, and such differential loss does not seriously interfere with this objective.

Survey Materials

Three different survey questionnaires were used in the successive surveys of panel members in 1965, 1966, and 1967. Each survey questionnaire consisted of two sections: the first section contained questions concerning personal characteristics, educational plans, achievements during the past college year, opportunities for special educational or counseling experiences (e.g., honors programs, undergraduate research participation), participation in various types of living arrangements or extra-curricular activities, and attitudes towards requirements of a satisfying job or career (19); the second section, containing parts A and B, consisted of 23 college press scales, some of which were similar to scales previously described by Thistlethwaite and Wheeler (53).

TABLE 6

Subject Loss Associated with Reported Characteristics of Respondent's Parents

Characteristic reported in Summer, 1965	1966 Survey[a]			1967 Survey		
	D.S. (N = 2,329)	A.S. (N = 1,718)	A.S. as % of D.S.	D.S. (N = 1,718)	A.S. (N = 1,178)	A.S. as % of D.S.
Estimated family income (all sources before taxes)						
Less than $7,500	570	434	76.1	434	310	71.4
$7,500-14,999	1018	751	73.8	751	533	71.0
$15,000 or more	533	388	72.8	388	261	67.3
Don't know or no response	208	145	69.7	145	74	51.0
Mother's education						
Some high school or less	340	260	76.5	260	185	71.2
Finished high school	875	638	72.9	638	410	64.3
Some college	588	447	76.0	447	303	67.8
Bachelor's degree	402	289	71.9	289	216	74.7
Master's or higher	116	83	71.6	83	64	77.1
Don't know or no response	8	1	12.5	1	---	----
Father's education						
Some high school or less	518	387	74.7	387	272	70.3
Finished high school	579	417	72.0	417	266	63.8
Some college	482	364	75.5	364	243	66.8
Bachelor's degree	399	295	73.9	295	215	72.9
Master's or higher	346	255	73.7	255	182	71.4
Don't know or no response	5	---	----	---	---	----

[a] See footnote a, Table 3.

Copies of the questionnaires used in each of the three surveys are included in Appendix B.

Uses made of the questions in the first section of each questionnaire are described in subsequent chapters in sections where relevant results are discussed. The remainder of this chapter will describe the characteristics of the college press scales used to assess college environments.

Instructions for completing college press scales. On each of the summer surveys students were asked to describe their undergraduate environments during the immediately preceding school year. On the faculty press scales, the respondent rated on a five-point Likert-type rating scale the degree to which given statements characterized the faculty members with whom he had had most of his courses or had known best, as the following instructions indicate:

> Statements in PART A are about faculty members with whom you have had most of your courses or have known best during the past year--their courses and teaching methods, their values and emphases, and their formal and informal interactions with you. The ratings you make here may or may not correspond to the ratings you would make of faculty members in other parts of the college or university. We do not want you to describe all faculty members in your school. Think only of the teachers with whom you have had most of your courses or have known best during the past year. We want you to describe their behavior and the effects of their behavior upon you.[1]

On the student press scales, the respondent rated the degree to which given statements characterized the students he had known best or associated with most commonly during the past academic year:

> Statements in PART B are about the undergraduate colleagues you knew best during the past year. Your answers to this part should tell us what was generally characteristic of the undergraduate students you knew best, identified with, or associated with most commonly during the past year. The ratings you make for your personal associates in your undergraduate school may or may not correspond to the way you would rate undergraduates in general or other groups of students at your college. Describe only those students you knew best and associated with most commonly. They may, or may not, be students in your major field, living quarters or campus clubs.[2]

Except for the minor discrepancies noted, the instructions and press items for the college press scales were identical in each of the surveys. On the later surveys, the following paragraph was added in the general instructions:

> Although you answered a similar set of items last year, your college environment has undoubtedly changed in several respects since you last reported. We want to study permanence and change in college environments and to relate such changes to the development of student career plans. So please complete the following items even though many of them are similar to items in the survey you completed last year.

Reliabilities of the college press scales. Descriptive statements were designed to yield scores on 12 faculty press scales and 11 students press scales. Each scale contained 6 items, 3 keyed so that "Agree" responses were weighted more heavily, and 3 keyed so that "Disagree" responses were weighted more heavily. Kuder-Richardson formula 20 reliability estimates (18) were estimated separately for men and women on the basis of responses to each survey. Among men the scale reliabilities on the initial survey ranged from .52 to .86, with a median value of .75; only four of the scales had reliabilities below .65--Faculty Evaluations of Ability, Faculty Press for Science, Student Press for Academic Achievement, and Student Press for Vocationalism. Among women the scale reliabilities on the initial survey ranged from .48 to .84, with a median value of .76; only two of the scales had reliabilities below .65--Faculty Press for Science and Student Press for Vocationalism. Appendix C lists each scale together with the six descriptive items (Table C-1) and the reliability estimates (Table C-2) for each scale.

---

[1] The instructions used in the 1965 survey did not have the phrase, "during the past year" underlined; this phrase was underlined in later surveys.

[2] The 1965 survey did not contain the phrase "during the past year" in the first sentence of this paragraph, though this phrase was included in the second sentence. Instructions for later surveys were as shown above.

Factor analysis of item intercorrelations. In order to verify the clustering of items into scales on the basis of item content and previous research (53) factor analyses of item intercorrelations were performed. Separate analyses were done for the 72 faculty press items and for the 66 student press items, using the pooled responses of all 1,178 panel members to the 1966 survey.[1]

Of the 12 clusters of faculty press items, 9 emerged as having relatively simple factor interpretations which corresponded with the manifest content of the clusters. Table 7 shows the factor pattern coefficients for each item on the relevant factors. These coefficients represent the beta weights for predicting the given item score from the factors, and the absence of an asterisk in the upper half of this table indicates that the given item had an appreciable loading only on the given factor. The signs of these coefficients generally reflect whether the item was coded "T" or "F." For example, the first and second items in the first scale, Faculty Enthusiasm for Intellectual Values, had factor-pattern coefficients of .79 and -.61, respectively, and Table C-1 (Appendix C) shows that these two items (items 27 and 39) were coded "F" and "T," respectively. This relationship arises from the fact that in computing item intercorrelations,

---

[1] In these, and in the subsequent analyses based upon scale intercorrelations, principal axes factor analyses with ones in the diagonals of the correlation matrix were performed. The resulting factors were rotated to orthogonal simple structure by means of the Varimax method, and then an oblique rotation was performed using the Promax method with k = 4 (23). Both in the analyses for items and in that for scale scores (described in the next section of this chapter) the Promax method resulted in superior simple structure. In the analysis for faculty press items, 56 percent of the loadings from the Varimax rotation fell within the hyperplane count (± .10) as compared with 75 percent of the loadings for the Promax rotation. In the analysis for student press items, 64 percent of the loadings from the Varimax rotation, and 77 percent of the loadings from the Promax rotation fell within the hyperplane count. In the analysis for scale scores the corresponding percentages were 61 and 78, respectively. In all three analyses it was evident that the data were more readily interpreted in terms of the oblique factors.

TABLE 7

Factor Pattern Coefficients for Items in Faculty Press Scales

Scale	Factor on which coefficients are reported	Factor-pattern coefficient[a] Ordinal position of item in content cluster 1st	2nd	3rd	4th	5th	6th
I. Items Clusters with Simple Factor Interpretations							
1. Enthusiasm for Intellectual Values	A	79	-61	56	-64	88	-60
2. Supportiveness	B	-54	67	50	-81	50	-65
3. Vocationalism	C	-82	86	85	-65	-51	43
5. Compliance	D	-75	83	-60	68	85	-52
7. Humanities	E	-22*	90	-73	93	70	-75
8. Advanced Training	F	70	-56	-48*	68	45	-28*
10. Adequacy as Positive Role Models	G	57	-57	76	-38*	-24*	44*
11. Excellence of Teaching	H	70	-84	77	-37*	86	-68
12. Affiliation	B	81	-47	-88	85	-87	74
II. Item Clusters with Complex Factor Interpretations							
4. Independent Thinking	B		-34	-40	24		32
	A	57			36	-37	24
	I		43	39	-25	38	
6. Evaluations of Ability	B			-50	31		-50
	J	-80	76	46			
	K				20	67	
9. Science	L	77		69		68	
	M		74		68	-33	73

[a] Coefficients less than 20 are not shown and decimals are omitted. These coefficients are the beta weights for predicting the given item score from the given factor. Ordinal positions refers to the orders of items as shown in Appendix C.

*These items had factor-pattern coefficients exceding 30 on one or more other factors. Asterisks are shown only in Part I of this table.

no attempt was made to apply the reflected weights for items coded "F" (though the correct weights as described in the footnote to Table C-1 were applied in computing all scale scores in subsequent analyses).

Two of the scales, Faculty Supportiveness and Faculty Press for Affiliation, had a correlation of .76 for 1966 responses, and it is therefore not surprising that the items in these two scales can be accounted for by a single factor (factor B). Of the three faculty item clusters having relatively complex factor interpretations (Part II of Table 7) the last is the most interesting: in the cluster of items designed to assess faculty press for science the three items having high coefficients on factor L were all coded "F" while the three items having high loadings on factor M were all coded "T." Moreover, the correlation between the oblique factors L and M was only .10. Thus there is evidence that the "T" and "F" items in the Faculty Press for Science scale do not have much in common. The low pretest reliabilities for this scale (.58 and .48 for men and women, respectively) suggest a similar conclusion. Nonetheless, except for the three scales noted, the factor analysis provided striking confirmation of the clustering of the faculty press items.

Table 8 shows that of the 11 clusters of student press items, 10 had relatively simple factor interpretations corresponding with the manifest content of these clusters. Two of the student scales, Student Press for Reflectiveness and Student Press for Intellectualism, had a correlation of .73 for 1966 responses, and Table 8 indicates that the items of these two scales can be largely accounted for by a single factor (factor C). Only the item cluster for student press for academic achievement had a relatively complex factorial interpretation.

Factor analysis of scale intercorrelations. Each of the 23 college press scales was administered at the completion of the sophomore, junior, and senior years of college, yielding a total of 69 scale scores for each subject. These scores were intercorrelated for all 1,178 panel members, and a factor analysis performed by the methods already described. Of the 14 factors extracted, 13 appear to have fairly simple interpretations. The first three oblique factors (A', A'', and A''') shown in Table 9 each tend to predict scores on the same 10 press scales. However, factor A' best predicts scores obtained on these scales at the end of the sophomore year; factor A'' best predicts the corresponding scale scores at the end of the junior year; and factor A''' best predicts scores on these scales at the end of the senior year. For example, Table 9 shows that factor A' (a sophomore-year factor) had beta weights of .88 and .86, respectively, for predicting 1965 scores on scales 2 and 12 (Faculty Supportiveness and Faculty Press for Affiliation). However, this same factor had beta weights (factor-pattern coefficients) of only .05 and .06, respectively, in predicting 1966 scores on these same scales (the latter weights are not shown in Table 9). Similarly, factor A'' (a junior-year factor) had beta weights of .79 and .76 for predicting 1966 scores on scales 2 and 12, respectively, but this same factor had beta weights of -.01 and -.05, respectively, for predicting 1965 scores on these same scales. An analogous state of affairs exists for factor A''' (a senior-year factor).

The correlations shown in Table 10 may help to illustrate the nature of the first three oblique factors, which clearly represent "occasion" factors. Thus, it may be seen that sophomore-year scores on scale 2

TABLE 8

Factor Pattern Coefficients for Items in Student Press Scales

Scale	Factor on which coefficients are reported	Factor-pattern coefficient[a]					
		Ordinal position of item in content cluster					
		1st	2nd	3rd	4th	5th	6th
I. Item Clusters with Simple Factor Interpretations							
13. Estheticism	A	-95	67	79	-95*	-100	86
15. Vocationalism	B	60	-37*	-63	67	55	-65
16. Reflectiveness	C	54	-67	-30*	91	92	-88
17. Unfavorable Self-Evaluations	D	77	-77	-79	77	59	-34*
18. Advanced Training	E	-89	85	38	-20*	31*	-35*
19. Science	F	-53*	58	86	-91	82	-92
20. Opposition to Faculty Influence	G	96	-86	95	68	-03*	-08*
21. Intellectualism	C	33*	-24	-39*	88	43*	-57
22. Affluence	H	26*	81	-74	-47*	84	-15*
23. Playfulness	I	76	-54*	-42*	76	69	-61
II. Item Cluster with Complex Factor Interpretations							
14. Academic Achievement	I				-56		
	J	-44	61	88		-32	68
	K	76	-21	-37	36	86	-29

[a] See footnote a, Table 7.

*These items had factor-pattern coefficients exceeding .30 on one or more other factors. Asterisks are shown only in Part I of this Table.

correlated highly (.73) with sophomore-year scores, but only moderately with junior-year (.40) and senior-year (.24) scores, on scale 12. In other words, knowing that a student's teachers in the second year of college were highly supportive would enable one to predict with some accuracy that these same teachers were also warm and friendly (high in affiliation), but would enable one to predict with much less accuracy the affiliation of the teachers the student knew best in the junior and senior years of college. More generally, Table 10 illustrates that scores on different press scales with high loadings on one of the A factors tend to correlate highly when the scores were all obtained at the same time, but show considerably lower intercorrelations on the average when the scores were obtained at different times. These findings indicate that the faculty members described on these faculty press

TABLE 9

Factor Structure of College Press Scale Scores Obtained at Completion of Sophomore, Junior, and Senior Years in College

Factors	College Press Scales	Factor-pattern coefficients[a] Soph.	Jr.	Sen.
A'--sophomore year factor;	2. Faculty Supportiveness	.88	.79	.85
	12. Faculty Press for Affiliation	.86	.76	.86
A''--junior year factor;	10. Faculty Adequacy as Positive Role Models	.78	.81	.85
A'''--senior year factor;	11. Faculty Excellence of Teaching	.73	.85	.77
	4. Faculty Press for Independent Thinking	.80	.75	.75
	1. Faculty Enthusiasm for Intellectual Values	.72	.76	.73
	6. Faculty Evaluations of Ability	.74	.68	.79
	8. Faculty Press for Advanced Training	.64	.62	.58
	7. Faculty Press for Humanities	.52	(.47)	(.43)
	20. Student Opposition to Faculty Influence	-.51	-.56	-.48
B	5. Faculty Press for Compliance	.80	.84	.77
C	7. Faculty Press for Humanities	(.42)	.54	.57
D	9. Faculty Press for Science	.73	.76	.69
E	3. Faculty Press for Vocationalism	.66	.72	.73
	15. Student Press for Vocationalism	.62	.73	.73
F	13. Student Press for Estheticism	.87	.91	.83
	16. Student Press for Reflectiveness	.86	.87	.76
	21. Student Press for Intellectualism	.73	.78	.65
G	19. Student Press forScience	.81	.82	.83
	18. Student Press for Advanced Training	(.61)	.61	.64
H	17. Student Press for Unfavorable Self-Evaluations	.84	.89	.86
I	23. Student Press for Playfulness	.80	.86	.85
J	22. Student Press for Affluence	.86	.89	.85

TABLE 9--Continued

Factors	College Press Scales	Factor-pattern coefficients[a]		
		Soph.	Jr.	Sen.
K	14. Student Press for Achievement	.61	.79	.79
L'--sophomore year factor	18. Student Press for Advanced Training	.64		
	14. Student Press for Academic Achievement	(.55)		
	21. Student Press for Intellectualism	(.52)		
	19. Student Press for Science	(.46)		

[a]Coefficients are beta weights in predicting the indicated scale scores from the factor listed in the first column. The factor-pattern coefficients listed are the highest ones for the given scale scores. Exceptions to the latter rule are indicated by coefficients in parentheses, and in these cases the factor having a higher weight for predicting the given scale scores is shown elsewhere in the table.

TABLE 10

Product-Moment Correlations Between Scores of 1,178 Students on Faculty Supportiveness and Faculty Press for Affiliation Scales

Scale	Year scores on given scale were obtained	Scores on Scale 2-Faculty Supportiveness		
		Year scores were obtained:		
		Sophomore (1965)	Junior (1966)	Senior (1967)
12-Faculty Press for Affiliation	1965	.73	.43	.42
	1966	.40	.76	.47
	1967	.24	.48	.77

scales either differed from year to year or were seen as having characteristics which differed from year to year.

The three A factors may be interpreted as faculty rapport factors. The factor-pattern coefficients show that students tended to evaluate the teachers they knew best during a given year in terms of a fairly global, "good rapport" vs. "bad rapport" dimension. If a student saw his teachers in a given year as highly supportive he also tended to see them as (a) high in affiliation, (b) adequate as positive role models, (c) excellent teachers, (d) interested in developing independence of judgment, (e) enthusiastic about intellectual values, (f) providing positive evaluations of his ability, (g) encouraging students to do graduate work, and to a somewhat lesser extent (h) encouraging students to take courses in the humanities. Finally, the negative coefficients for scale 20 shown in Table 9 mean that students exhibiting good rapport with their teachers in a given year tended to report that the undergraduate students with whom they associated most that year showed little opposition to faculty influence.

One interpretation of these three factors is that the students were manifesting a general "halo effect." For example, Issacson, et al. (24) interpreted a similar teacher "skill" factor they found as representing such a judgmental error. However, we have no evidence that the high correlations between selected trait attributions were spurious. An alternative interpretation, equally compatible with the data, is that the clustering we observe in the scales loading highly on the A factors arose from the objects being described. In other words, faculty attributes may in fact co-vary as students perceive them to co-vary. Faculty members who tend to be supportive, may also tend to be high in affiliation, admirable as role models for students, excellent teachers, insistent upon developing independence of judgment, etc.

Table 10 suggests the possibility that the oblique A factors may be intercorrelated, and this was in fact the case. The intercorrelations among the 14 factors are summarized in Table 11, and it can be seen that factors A', A'', and A''' showed moderate intercorrelations. Clearly, there was some degree of stability, from year to year, in the kind of rapport a student seemed to enjoy with his college teachers.

The remaining 10 interpretable factors in Table 9, unlike those just considered, were defined by the content of the relevant scales and only negligibly by the time at which these scale scores were obtained. For these factors, therefore, there is considerable stability in the particular faculty and student press to which the student reported being exposed from year to year. For example, a student who reported being exposed to strong faculty press for science (factor D) at the end of his sophomore year, tended to report similar press at the end of his junior and senior years. Similarly, a student reporting much student playfulness (factor I) among his close friends in 1965, tended to report similar playfulness in 1966 and 1967. In Table 9, we see that factor D had beta weights of .73, .76, and .69 for predicting scores on the scale, Faculty Press for Science, obtained in 1965, 1966, and 1967, respectively. Parenthetically, we may note that despite the heterogeneity of the items in the scale for assessing faculty press for science (Table 7) nonetheless the scale had sufficient coherence for scores on it to be predicted well on each measurement occasion by a single factor (factor D in Table 9). The results in Tables 9 and 11 suggest that the 13 interpretable factors may be named as follows (where Roman numerals in the name indicate that the factor is specific to the college year indicated):

TABLE 11

Table of Intercorrelations of Oblique Factors Extracted in Factor Analysis of College Press Scale Scores

	Product-Moment Correlations (Decimals omitted)[a]													
Factors	A'	A''	A'''	B	C	D	E	F	G	H	I	J	K	L'
A'	--	54	50					40	25					
A''		--	55					38	25					
A'''			--					42	33					
B				--	-23	28			-21					
C					--	-20								
D						--								
E							--	-30						
F								--	34			-22	23	
G									--				21	-23
H										--				
I											--	29		
J												--		
K													--	
L'														--

[a] Only correlations having an absolute value of .20 or greater are shown.

Factor	Name
A'	Faculty Rapport, II
A''	Faculty Rapport, III
A'''	Faculty Rapport, IV
B	Faculty Exactitude
C	Faculty Humanism
D	Faculty Scientism
E	Faculty and Student Vocationalism
F	Student Humanism
G	Student Scientism and Professionalism
H	Student Competition
I	Student Playfulness
J	Student Affluence
K	Student Achievement

The last factor (L') in Table 9 does not appear to be readily interpretable, except that it is clearly a sophomore-year factor, since its sizeable loadings are exclusively on scores obtained in 1965.[1]

Student reports of teachers and students described. Some data ~~was~~ were obtained on the teachers and peers respondents claimed they were describing in the ratings on faculty and student press items. Unfortunately, identical questions concerning the objects of description were not repeated on all three surveys. Nonetheless these reports are useful, as we shall see, in interpreting some of the analyses to be reported in later chapters. Table 12 shows that during the first two survey years most respondents indicated that they were describing student colleagues they had met in their dormitories, rooming houses, or fraternities. However, there was a tendency for a larger proportion of the junior-year, than of the sophomore-year, reports to describe students met in the respondent's major field of study. The large majority of respondents said they were either describing exclusively or primarily same-sex student colleagues. At the time of the last survey, about three-fourths of the panel members said the faculty members they had described were in their major field of study, while only about one-third of the panel said that most of the student colleagues described were in their major field of study.

Summary. Each of the college press scales designed to assess college environments had sufficient reliability to justify group comparisons. Most of the scales had relatively simple factorial interpretations. Factor analyses showed that most of the scales had moderately high internal consistency, and can be described as assessing some 13 interpretable dimensions (factors) of college press. Three of the factors were temporal factors for predicting press at different stages of college, and referred to a fairly, global faculty rapport factor. The remaining 10 factors referred to dimensions corresponding fairly closely to those anticipated in the design of the survey materials.

---

[1] Ambiguities concerning the interpretation of factor L' arise in part from the results of a factor analysis, similar to the ones described, performed on the intercorrelation matrix of the oblique factors (partially reported in Table 11). It was found that factors G and L' had positive and negative loadings, respectively, on a higher-level factor, even though both of these factors had sizeable positive loadings in the lower-order analysis on 1965 scores on scale 18. Other results of the higher-order factor analysis confirm the factor structure which is suggested in Table 11. For example, oblique factors A', A'', A''', and (to a lesser extent) F loaded highly on a second higher-order factor; on a third higher-order factor, factors B and D had positive loadings and C a negative loading; on a fourth, factors I and J had positive loadings; and on a fifth, factors E and F had negative and positive loadings, respectively.

TABLE 12

Respondent's Statements Concerning Faculty Members and Student Peers Described on College Press Scales

Question	Percentage of respondents making given response			
	Men (N=655)		Women (N=523)	
I. 1965 and 1966 Surveys				
Where did you meet the undergraduate colleagues you will be describing? (Circle the one which best applies.)	1965	1966	1965	1966
Dormitory or rooming house	32	22	52	39
My fraternity or sorority (or equivalent)	26	25	15	16
Campus activities	14	12	11	10
Class in my major field	15	22	12	18
Other	13	19	10	17
Does this group include both men and women? (Circle one.)				
No, men only	46	41	--	--
Yes, but primarily men	51	55	09	13
Yes, but primarily women	2	04	66	66
No, women only	--	--	24	21
II. 1967 Survey				
Are most of the faculty members you have just described in your major field of study?				
Yes	73		78	
No	27		21	
Are most of the student colleagues you will be describing in your major field of study?				
Yes	37		36	
No	61		63	
No response	2		1	

CHAPTER III

SOME EFFECTS OF ENTERING A FIELD OF STUDY

In this chapter the major objective is to summarize quasi-experimental tests of the hypotheses that entry into a field of study has the effect of producing changes in student dispositions and in the faculty and student press to which the student is exposed. In the course of the analysis we shall consider a number of alternative methods for assessing effects, and attempt to identify conditions under which conventional analysis of covariance methods may be trusted not to lead to spurious results. These methodological analyses and the conclusions to which they led are also discussed in this chapter.

The Opportunity and Problem of Quasi-Experimental Comparisons

The structure of the American undergraduate curriculum provides the basis for quasi-experimental comparisons of the effects of entering a field of study. Such comparisons differ from true experimental comparisons in that, in the latter, subjects have been randomly assigned to treatment groups. Also such comparisons differ from simple longitudinal observations on panels of respondents in that, in the quasi-experimental comparison, there is always a presumption that different treatments have their maximal impacts during the interval between a pretest and a posttest, so that treatment differences offer one plausible explanation for posttest differences between groups. Campbell and Stanley (13) have described numerous designs which provide such comparisons. Students in professional as well as liberal arts programs in this country typically are required to take courses in a variety of academic fields during the first two college years, and then tend to specialize in a single major field during the last two undergraduate years. As a consequence it can be expected that the effects of entering a major field of study will be exhibited maximally during the last two years of college. The present chapter is concerned mainly with a quasi-experimental test of the effects of entering a major field of study.

Are students exposed to different kinds of teacher and peer press as a consequence of entering a major field of study? If so, how do fields of study differ with respect to changes in faculty and student press which are the consequences of such specialized study? How do fields of study differ with respect to their effects upon student aspirations and values? Bereiter (9) points out that it is difficult to answer such questions because different fields of study attract different kinds of students. Bereiter and Friedman (10) and Warnath and Fordyce (57) found that when a pretest is obtained before students formally declare, and enter, their major field of study it can be predicted with confidence that students classified by their prospective fields of study will differ markedly in personality and values on the pretest. The problem of adequately controlling group differences on the pretest in order to compare the effects of field of specialization on the posttest has appeared to be insoluble to Bereiter (9) and Lord (32). Covariance analysis has been the conventional technique for removing the effects of pretest differences between groups; however, Lord (30, 31, 32) has argued that the conventional analysis of covariance, which ignores errors of measurement on the covariable, cannot be counted on to make proper allowance for uncontrolled preexisting differences between groups.

Lord (30) described a significance test for covariance analysis which takes account of unreliability in the covariable, but Lord's U statistic is limited to the comparison of only two treatment groups. More recently, Porter (36) has proposed a more generally applicable solution to the problem of estimating the regression of the dependent variable upon the true parts of one or more fallible covariables (i.e., of estimating the structural relationship). Briefly, Porter's solution consists in performing the analysis of covariance using estimated *true* pretest scores as the covariable. He has shown by Monte Carlo methods that this mode of analysis yields good estimates of the structural relationship when the reliability of the covariable is .7 or greater and sample sizes are 20 or greater. Porter also found that when the reliability of the covariable was only .5 the agreement of the generated distributions of F to their theoretical counterparts was not quite as good, but still close.

Porter's method requires an estimate of the reliability of the covariate, but such reliability measures were not available for all of the variables to be considered. Accordingly, a new method based upon the principle of contrasting paired-treatment and internal regressions was developed for testing hypotheses involving these variables.

Treatment Groups

On the basis of each student's initial response concerning his major field of study "during the next two years of college" he was classified into a major field group. Any student reporting an undergraduate major field of study in 1967 different than that reported two years earlier was reassigned to a miscellaneous group. Men were finally assigned to 14 fields and women to 11 fields as shown in Tables 13 and 14.

For the purposes of this analysis, two of the press scales (Faculty Press for Humanities and Faculty Press for Science) may be regarded as "marker variables," since scores on these scales should reflect highly predictable changes in the curriculum of students as they progressed through college. For example, one would expect that majors in the physical sciences and engineering would show increases in faculty press for science, and decreases in faculty press for humanities as they progress in their specialized fields of study. Majors in English, fine and applied arts, and history, on the other hand, would be expected to show the opposite trends. If our analysis had not revealed these trends, we might well have questioned the validity of the press scales, the appropriateness of the analytic methods, or both.

Ecological Effects of Entering a Field of Study

For each of the 23 college press scales two analyses of covariance were performed using as the covariable estimated true pretest scores (i.e., 1965 true press scores), following the procedures described by Porter (36). In one analysis 1966 press scores, and in a second analysis 1967 press scores, comprised the dependent variable. Covariable reliabilities used in these analyses were estimated separately for men and women (cf. Chapter II).

The analyses of covariance using true pretest scores as the covariable are considered the best available tests of causal effects, and the major tests of the ecological hypotheses were based upon these analyses which are summarized in Tables 13-16. An entry is shown in these tables for each analysis yielding an F-ratio (for testing the significance of the differences between adjusted means) significant at the .05 level or higher. Adjusted means listed under the "1" columns in these tables represent mean press scores for fields of study based upon reports after the completion of the junior year, adjusted to remove differences between fields in estimated true scores on the pretest. Similarly, adjusted means listed under the "2" columns of these tables represent mean press scores for fields based upon reports after the completion of the senior year of college, adjusted to remove differences between fields in estimated true scores on the pretest. Thus these two sets of adjusted means can be considered effects of entering a specialized field of study over one-year and two-year intervals, respectively. In these tables, the deviation scores shown are the differences between the adjusted mean of a field and the adjusted grand mean score for all fields. Positive deviations represent greater increments in the given press.[1]

---

[1] In the text only the major trends appearing in the data can be discussed, but the reader may be interested in making additional comparisons between pairs of fields on particular scales. To calculate an F-ratio for estimating the significance of the difference between means for any two fields, the square of the algebraic difference between the tabled deviation scores may be divided by the product of the average effective error per unit (shown at the bottom of each column) and $(1/N_1 + 1/N_2)$, where N_1 and N_2 are the N's for the fields to be compared. For men (Tables 13 and 16) the degrees of freedom for evaluating such an F-ratio are 1 and 640; for women (Tables 14 and 15) the corresponding degrees of freedom and 1 and 511. This formula for evaluating the significance of the difference in adjusted mean scores between any two fields is one suggested by Cochran and Cox (15, p.79), and takes due account of the unequal sizes of the treatment groups. Some F-ratios for comparing individual pairs of fields are reported in Tables 19 and 20, and in Tables D-1 and D-2 of Appendix D.

Effects upon faculty press to which students were exposed. In tables 13, 14, and 15 it may be seen that the expected effects upon the marker variables (faculty press for science and faculty press for humanities) were exhibited by both men and women. Students majoring in engineering and in the physical sciences exhibited the expected increases in faculty press for science, and those majoring in English, the fine and applied arts and history showed the expected increases in faculty press for humanities.

Sizeable effects were also observable on the scale, Faculty Press for Vocationalism. Among men, specialization in business administration, the health professions (mostly students majoring in pharmacy), or engineering was associated with a relative increase in press for vocationalism, while specialization in education, English, or political science was accompanied by a relative decrease in such press (Table 13). Among women, entry into the health professions (mainly, nursing training) and education produced relative increases in faculty press for vocationalism, while entry into sociology, mathematics, psychology, and English produced relative decreases in such press (Table 14).

Effects upon faculty press for advanced training were less marked but nonetheless statistically significant. Among men, entry into physics or chemistry was accompanied by an increase in such press, while entry into fine and applied arts, the health professions, or education meant a relative decrease in such press (Table 13). Among women entry into nursing produced an increase in press for advanced training, while entry into sociology produced a decrease in such press (Table 15).

The effects on the remaining faculty press scales shown in these tables were of borderline significance ($p < .05$) and without further comparisons of the type suggested above one should be cautious in making comparative statements for fields other than the highest and lowest ranking fields. Among men, entry into the biological sciences or political science increased the favorableness of faculty evaluations of ability more than entry into education (Table 13). Among women, entry into nursing as a major field of study increased both the favorableness of faculty evaluations of ability (Table 15) and faculty supportiveness (Table 14) more than entry into sociology or anthropology. Among women specialization in the biological sciences increased the likelihood of being exposed to teachers students rated as excellent more than specialization in the fine or applied arts (Table 15).

Finally, it is of some interest that there was no evidence of differential field effects with respect to the following faculty press: adequacy as positive role models, affiliation, compliance, enthusiasm for intellectual values, and independent thinking.

TABLE 13

Adjusted Mean Scores on Faculty Press Scales of 655 Men in 14 Fields of Study

Major Field of Study	N	Deviation Scores: Press for Science 1	Press for Science 2	Press for Humanities 1	Press for Humanities 2	Press for Adv. Trng. 1	Press for Adv. Trng. 2	Press for Vocationalism 1	Press for Vocationalism 2	Eval. of Ability 2
Engineering	41	1.73	1.88	- .98	-1.03	.92	1.39	.95	1.19	- .21
Physics, Chemistry	38	.81	1.84	- .56	-1.21	1.42	1.58	- .16	- .73	- .68
Biol. Sciences	57	.56	1.02	- .08	- .10	.30	.50	- .76	- .22	.66
Psychology	34	.59	.66	- .90	.17	- .05	.22	- .03	- .24	.51
Math., Statistics	24	.44	.63	.13	- .93	.15	.16	.57	.02	-1.40
Miscellaneous	168	- .24	- .13	.15	.40	- .35	- .09	.19	- .16	.63
Business	111	- .09	- .17	- .82	-1.22	- .32	- .35	.76	1.83	- .23
History	43	- .91	- .56	1.94	1.33	.39	.01	- .92	- .73	- .09
Economics	29	- .07	- .80	.26	.37	.70	- .31	- .53	- .65	-1.47
Education	12	.79	-1.14	1.20	-1.18	- .12	-2.01	.36	-1.43	-2.27
Health Prof.	5	.17	-1.35	-6.52	-2.19	-2.17	-1.64	1.41	1.73	-1.99
English	32	- .51	-1.36	2.50	2.45	.25	- .18	-1.44	-1.37	- .20
Fine, Applied Arts	17	-1.74	-1.44	.71	1.76	-2.32	-1.78	-1.61	-1.03	- .38
Pol. Science	44	- .85	-1.50	- .11	.65	- .22	- .58	- .01	-1.29	.66
Total	655									
Average effective error per unit		8.06	7.81	12.89	13.60	12.15	12.06	13.11	13.83	13.26
F-ratio (homogeneity of adj. means)		2.57**	4.84**	4.05**	3.33**	1.83*	2.17**	1.77*	3.64**	1.97*
F-ratio (homogeneity of regression)		.97	.62	1.32	1.93*	.95	.90	.65	1.94*	.90

*$p < .05$

**$p < .01$

TABLE 14

Adjusted Mean Scores on Selected Faculty Press Scales
of 523 Women in 11 Fields of Study

Major Field of Study	Number of students	Deviation Scores					
		Press for Humanities		Supportiveness		Press for Vocationalism	
		1	2	1	2	1	2
English	61	1.85	2.27	00	- .32	- .91	-1.08
Mod. For. Lang.	34	1.60	2.22	.33	-1.01	.64	- .77
Fine, Applied Arts	33	1.99	1.06	.05	- .21	- .12	- .82
History	20	.27	.95	-1.24	- .23	- .34	- .79
Psychology	25	- .96	.05	- .94	.94	-1.98	- .95
Sociology, Anthro.	27	-1.41	- .28	-2.04	- .90	-1.51	-1.17
Biol. Sciences	24	- .43	- .40	.31	.84	- .02	1.21
Health Prof.	26	-1.81	- .47	1.89	2.83	2.06	2.84
Miscellaneous	195	- .46	- .64	.01	- .10	- .02	.21
Education	58	- .01	-1.28	.53	- .11	1.57	1.29
Math., Statistics	20	-1.49	-2.07	.04	- .11	- .62	-1.43
Total	523						
Average effective error per unit		12.38	14.97	14.62	15.49	11.92	14.51
F-ratio (homogeneity of adjusted means)		4.78**	4.80**	1.93*	2.05*	3.89**	3.71**
F-ratio (homogeneity of regression)		1.89*	2.41**	1.87*	1.53	1.90*	1.54

*$p < .05$
**$p < .01$

Effects upon student press to which students were exposed. As we have seen in Chapter II, at the time of the final survey after completion of the senior year, about three fourths of the respondents said that most of the teachers they had described were in their major field of study but only about one third of the respondents indicated that most of the students they were describing were in their major field of study. It is all the more striking therefore that the treatment classification by the respondent's major field revealed such pervasive effects upon student press.

By far the most marked field effects with respect to changes in student press were observed on the scale, Student Press for Science. Table 16 shows that men majoring in physics or chemistry, the health professions, biological sciences, and engineering exhibited marked increases in student press for science, while those majoring in fine and applied

TABLE 15

Adjusted Mean Scores on Selected Faculty and Student Press Scales of 523 Women in 11 Fields of Study

		Deviation Scores					
Major Field of Study	Number of students	Student Press for Science 2	Fac. Press for Science 2	Fac. Press for Adv. Trng. 2	Excellence of Fac. Teach. 2	Fac. Eval. of Ability 1	Student Press for Estheticism 2
Biol. Sciences	24	2.90	1.27	.63	1.85	.01	- .77
Health Prof.	26	2.22	1.26	3.03	.41	1.77	-1.01
Psychology	25	.69	1.76	- .11	1.09	.96	- .84
Math., Statistics	20	.29	.96	- .86	- .74	- .83	.16
English	61	.05	- .96	- .51	1.26	- .07	.86
Miscellaneous	195	.06	- .06	.17	- .39	- .07	.10
Education	58	- .12	.15	- .89	- .73	.43	-1.25
Sociology, Anthro.	27	- .36	.03	-1.07	- .66	-1.55	- .14
History	20	- .52	- .47	.55	1.08	-1.16	.50
Fine, Applied Arts	33	-1.89	- .24	- .15	-1.47	- .63	1.18
Mod. For. Lang.	34	-2.24	-1.44	- .09	.55	.73	.50
Total	523						
Average effective error per unit		14.77	8.20	14.43	18.42	11.58	13.65
F-ratio (homogeneity of adjusted means)		3.95**	3.32**	2.57**	2.17*	2.20*	1.82*
F-ratio (homogeneity of regression)		1.87*	.73	.96	3.23**	2.01*	1.69

*$p < .05$
**$p < .01$

arts, education, business administration, and history showed marked decreases in such press. Similar field effects were observed among women (Table 15).

The finding that the effects of entering specialized fields of study are greater, if anything, upon student press for science than upon the two marker variables (faculty press for science or humanities) is reminiscent of C. P. Snow's (43) thesis that there is little communication between the two cultures--that of the scientists and that of the literary intellectuals. Thus the effects of majoring in physics or chemistry, the health professions, the biological sciences, or engineering are to increase the frequency with which students say that the following statements are characteristic of the peers they knew best:

TABLE 16

Adjusted Mean Scores on Student Press Scales of 655 Men in 14 Fields of Study

		Deviation Scores							
		Press for Science		Press for Adv. Trng.		Opposition to Fac.. Infl.	Press for Estheticism	Press for Reflectiveness	Press For Vocationalism
Major Field of Study	N	1	2	1	2	1	2	2	2
Physics, Chemistry	38	2.85	3.48	1.04	1.53	-1.48	.39	- .67	1.30
Biol. Sciences	57	2.50	2.35	1.54	1.37	- .25	.42	- .10	-1.13
Health Prof.	5	2.46	.96	-1.31	2.88	2.12	- .51	2.53	-1.62
Engineering	41	1.61	2.04	- .06	- .26	.81	-1.20	- .01	.84
Economics	29	.30	- .10	- .22	.81	- .58	.50	.85	.70
Miscellaneous	168	- .17	- .55	.06	- .51	.13	- .45	- .13	.09
Pol. Science	44	- .50	- .97	.15	.82	- .26	.32	1.37	- .24
Math., Statistics	24	- .63	- .38	- .90	- .41	.04	- .13	-1.17	1.20
English	32	- .80	-1.01	.79	.39	- .13	.88	- .07	- .70
Psychology	34	- .81	.09	.84	.96	.32	.76	- .14	.06
History	43	- .98	-1.18	.37	.47	- .44	1.69	1.76	- .24
Business Ad.	111	-1.01	- .80	-1.45	-1.22	.32	- .75	- .13	- .14
Education	12	-1.67	-1.74	- .71	- .48	-1.86	-1.03	-2.00	-1.31
Fine, Applied Arts	17	-2.62	-2.43	-1.18	-1.67	1.85	1.95	-2.78	- .15
Total	655								
Average effective error per unit		13.42	15.91	11.43	14.20	9.86	16.65	17.34	10.84
F-ratio (adjusted means)		5.77**	5.39**	3.13**	3.12**	2.11*	1.94*	2.24**	1.93*
F-ratio (homogeneity of regression)		2.26**	1.90*	1.04	2.20**	2.06*	1.51	2.10*	1.63

$^{*}p < .05$

$^{**}p < .01$

"they talked frequently about the philosophy and methods of science"; "most of my friends had strong interests in science and mathematics"; "most of them were planning careers in science." Since two-thirds of the respondents said that most of the students they were describing were not in their own major field of study, it appears that one consequence of majoring in one of these fields is to increase the frequency with which one associates with students in other physical sciences. The results obtained on the scale, student press for estheticism, suggests that proselytes to one of the disciplines within the humanistic tradition exhibit a similar, if less marked, tendency to associate mainly with majors in other humanistic fields. Thus, among both men and women those majoring in fine and applied arts showed greater increments in student press for estheticism than those majoring in the health professions (Tables 15 and 16).

There was also evidence of field effects on the scale, Student Press for Advanced Training: among men entry into physics or chemistry, the health professions, and the biological sciences was accompanied by relative increases in press for advanced training, while entry into fine and applied arts, business administration, or education was associated with relative decreases in such press. Similarly, there were greater increments in student press for reflectiveness reported among men majoring in the health professions than among those majoring in fine and applied arts or education (Table 16).

Two other borderline effects upon student press were found among men: entry into the health professions was associated with a greater increment in student opposition to faculty influence than entry into education; and entry into physics or chemistry was associated with a greater increment in student press for vocationalism than entry into the health professions. No significant field effects were found with respect to changes in the following types of student press: academic achievement, affluence, intellectualism, playfulness, and unfavorable self evaluations.

Restriction in the generalizability of the findings. In discussing quasi-experimental designs, Campbell and Stanley (13) note that an "interaction of selection and maturation" may frequently be mistaken for a treatment effect; such an interaction may also be interpreted as a restriction of the possible generality of experimental effects. For example, suppose that engineering students tend to specialize in engineering courses almost as much during the freshman and sophomore years as they do during the junior and senior years. In contrast, suppose that psychology majors follow a much more widely distributed course of study during the initial years, and tend to specialize in psychology courses only during the last two years of college. By administering the pretest at the completion of the sophomore year and the posttest at the end of the senior year of college, one may be comparing the effects upon engineering students during a period of relatively little change with effects upon psychology students during a period of marked ecological change. To the extent that prospective majors in any of the fields compared tended to specialize in their major fields during the initial college years, it would be improper to interpret the present procedures as yielding estimates of the total effects of entering a field of study. This follows because under the given hypothetical conditions removing field differences on the covariable at the end of the sophomore year partials out some of the very effects to be assessed. Clearly, the present analysis yields information only about the effects of entering a field of study during the last two years of college. However, the fact that the pattern of results on the two marker variables agreed closely with expectations suggests that the results may also be a reasonably good approximation to the results one would find if the pretest had been administered near the beginning of college.

Alternative Methods of Assessing Effects

In this section we shall summarize the results of several additional methodological analyses. The major purpose of these investigations was to ascertain whether there were conditions under which alternative methods might be used appropriately in analyzing effects upon variables for which pretest reliability measures were not available. In each case, the criterion for the fidelity with which a mode of analysis estimated effects was the degree of agreement with the true-score covariance analysis on the variables just considered. In other words, if an alternative mode of analysis can be shown, at least under some known conditions, to appropriately reflect these effects, then we may have some confidence in using this method to analyze effects upon other dependent variables.

Increases in treatment-outcome correlations. Campbell and Clayton (12) suggested that one symptom of causal effects in panel data is an increased correlation, from pretest to posttest, between dependent and independent variables. Campbell (personal communication) has recently called this symptom an "increase in treatment-outcome correlation." Such a condition would exist, for example, if the classification by treatment groups accounted for a greater proportion of the variance in posttest scores than of the variance in pretest scores. An appropriate index of change in the treatment-outcome correlation might be the difference in Omega-squared estimates based upon pretest analysis of variance and upon posttest analysis of variance (22, p. 382). If the estimate of Omega-square is greater for the latter than the former then an increase in the treatment-outcome correlation has occurred.

Conventional analyses of variance were performed on the pretest and posttest scores on each of the 23 college press scales to obtain estimates of the proportion of pretest and posttest variance associated with the classification by major field of study; these results were then compared with the results from the true-score covariance analyses just considered.

Tables 17 and 18 show comparisons for each scale having an overall covariance F-ratio significant at the .01 level, either when true pretest

TABLE 17

Comparisons of Covariance Analyses Using as the Covariable Fallible and True Pretest Scores of 655 Men in 14 Fields

		ω^2 based on ANOVA of			ANCOVA based upon				Correlation between adj. means (N=14)
					Fallible Pretest Scores		True Pretest Scores		
College Press Scale	Reliability (1)	Pre-test (2)	Post-test (3)	Dependent Var. (4)	F (5)	ω^2 (6)	F (7)	ω^2 (8)	(9)
				I. Faculty Press Scales					
Science	.59	.14	.19	1	6.06**	.09	2.57**	.03	.958
			.25	2	9.76**	.15	4.84**	.07	.973
Humanities	.80	.13	.19	1	5.87**	.09	4.05**	.06	.995
			.18	2	5.05**	.07	3.33**	.04	.997
Adv. Trng.	.72	.00	.04	2	2.45**	.03	2.17**	.02	.994
Vocationalism	.76	.08	.10	1	2.78**	.03	1.77*	.02	.974
			.13	2	4.78**	.07	3.64**	.05	.981
Enthusiasm	.71	.05	.06	1	2.25**	.02	1.59	.01	.989
				II. Student Press Scales					
Science	.88	.17	.26	1	8.00**	.12	5.77**	.09	.998
			.25	2	7.35**	.11	5.39**	.08	.996
Adv. Trng.	.74	.04	.11	1	4.61**	.07	3.13**	.04	.988
			.09	2	3.97**	.06	3.12**	.04	.995
Estheticism	.88	.05	.07	2	2.40**	.03	1.94*	.02	.994
Reflectiveness	.89	.02	.03	2	2.31**	.03	2.24**	.02	.995
Vocationalism	.56	.09	.08	2	2.44**	.03	1.93*	.02	.452

*$p < .05$

**$p < .01$

scores or fallible pretest scores were used as the covariable. The relevant comparisons in each of these tables may be found under columns 2, 3, and 7. The entries for the first row for the Faculty Press for Science scale in Table 17 show that there was an increment in the treatment-outcome correlation; for example, from cols. 2 and 3 we learn that the proportion of variance associated with the treatment classification increased from .14 to .19 from the pretest to the posttest. Table 17 also shows that a significant F-ratio of 2.57 was obtained (col. 7) from the covariance analysis using Porter's method. An inspection of these tables will reveal that on every scale except two (Student Press for Vocationalism in Table 17 and Student Press for Estheticism in Table 18) a significant F-ratio for the true-score covariance analysis was accompanied by an increase in the treatment-outcome correlation. Perhaps the most informative comparison, however, is the correlation between the difference in Omega-square values and the true-score F-ratio for the entire set of 23 press variables. For the one-year interval, the correlations were .90 and .87 for men and women, respectively, while for the two-year interval the correlations were .90 and .79 for men and women, respectively. It may be concluded that the criterion of an increment in the treatment-outcome correlation has moderate validity as a symptom of causal effects, but it is also clear that differential treatment effects may occur without resulting in an increased treatment-outcome correlation.

Conventional analysis of covariance. The second alternative mode of analysis investigated was conventional analysis of covariance in which fallible (rather than true) pretest scores were used as the covariate. Such analyses were performed for each of the 23 college press scales. For each type of covariance analysis (true-score and fallible) estimates of the proportion of variance in the adjusted scores associated with the major field classification were obtained by calculating Omega-squared values by an adaptation of the procedures described by Hays (22, pp. 381-384). Finally, the adjusted means obtained from each type of analysis were correlated.

Comparisons between the two types of covariance analyses are summarized in columns 5 through 9 in Tables 17 and 18. In general, the F-ratios and Omega-squared values obtained from the conventional covariance analyses were spuriously large. This was particularly true when the pretest had a relatively low reliability and there was a large Omega-squared value for the analysis of variance of pretest scores. The latter, of course, is a direct indicant of the fact that fields differed markedly on the pretest. For example, in Table 17 it is clear that the largest discrepancies between the F-ratios for fallible and true-score analyses occurred on the scale, Faculty Press for Science. Cols. 5 and 6 indicate that on this scale the fallible covariance analysis for 1967 posttest scores yielded an F-ratio of 9.76, and 15 per cent of the variance in the adjusted scores was associated with the field classification; in contrast, cols. 7 and 8 indicate that the true-score covariance analysis yielded an F-ratio of only 4.34, and only 7 per cent of the variance in the adjusted scores was associated with the field classification. Also, it can be seen that this scale had a pretest reliability

TABLE 18

Comparisons of Covariance Analyses Using as the Covariable Fallible and True Pretest Scores of 523 Women in 11 Fields

College Press Scale	Reliability (1)	ω^2 based on ANOVA of Pre-test (2)	ω^2 based on ANOVA of Post-test (3)	Dependent Var. (4)	ANCOVA based on Fallible Pretest Scores F (5)	ANCOVA based on Fallible Pretest Scores ω^2 (6)	ANCOVA based on True Pretest Scores F (7)	ANCOVA based on True Pretest Scores ω^2 (8)	Correlation between adj. means (N=11) (9)
			I. Faculty Press Scales						
Science	.48	.09	.18	2	7.93**	.12	3.32**	.04	.962
Humanities	.75	.14	.19	1	6.72**	.10	4.78**	.07	.995
			.17	2	6.35**	.09	4.80**	.07	.993
Adv. Trng.	.73	.01	.03	2	2.64**	.03	2.57**	.03	.893
Vocationalism	.74	.07	.13	1	5.34**	.08	3.89**	.05	.993
			.13	2	5.06**	.07	3.71**	.05	.995
			II. Student Press Scales						
Science	.87	.08	.15	2	5.22**	.07	3.95**	.05	.996
Estheticism	.85	.10	.10	2	2.47**	.03	1.82*	.02	.957

*p $< .05$

**p $< .01$

of only .59, and 14 per cent of the variance in pretest scores was associated with the classification by major field of study. Among women, the largest discrepancies in the overall F-ratios from the two types of analyses also occurred on the scale, Faculty Press for Science, and under similar conditions of low scale reliability and sizeable field differences on the pretest (Table 18).

The correlations in col. 9 of Tables 17 and 18 show that there was a very substantial correspondence in the adjusted means derived from the fallible and true-score analyses. Appreciable discrepancies in adjusted means for men occurred only on the scale, Student Press for Vocationalism (Table 17), where the two sets of adjusted means had a correlation of only .452 (not significant with an N of 14). Table 17 also shows that this scale had the lowest pretest reliability (.56) among men, and that 9 per cent of the variance in pretest scores was associated with the field classification. More pertinent, however, is the observation that there was a decrease in the Omega-squared value from the pretest to the posttest (.09 vs. .08). Among women, the press scale having the lowest pretest reliability (.48) was the scale, Faculty Press for Science. Table 18 shows that although this scale revealed both low reliability and sizeable field differences on the pretest, the adjusted means from the fallible and true-score analyses had a correlation of .962. It may be noted, however, that on this scale there was a marked increase in the Omega-square values from the pretest to the posttest (.09 vs. .18).

To summarize, for most of the dependent variables analyzed the overall F-ratio provided by the conventional analysis of covariance (which ignores errors of measurement in the covariable) leads to spuriously high significance levels. Nonetheless, Tables 17 and 18 show that there is considerable correspondence between the fallible and true score analyses. Thus every overall F-ratio, save one, from the fallible covariance analyses which was significant at the .01 level had a corresponding F-ratio in the true-score analyses significant at the .05 level or higher. These results suggest that conventional covariance analyses of quasi-experimental data in which the treatment classification accounts for 3 per cent or more of the variance in the adjusted scores may provide fairly robust, though slightly inflated, overall estimates of the significance levels which would be obtained with appropriate correction for measurement errors in the covariable. However, one caution suggested by the present results is that adjusted means derived from conventional covariance analyses in which there is a decrement in the treatment-outcome correlation may be seriously misleading. More specifically, these results suggest that the rank-order of adjusted means from fallible analyses are likely to be inaccurate when there is a decrement in the treatment-outcome correlation, but the adjusted means from such conventional covariance analyses may be reasonably accurate when there is a marked increase in the treatment-outcome correlation. In Appendix D, an analysis is presented which explains why this is likely to be the case.

The method of contrasting paired-treatment and internal regressions. The technique of comparing fallible and true-score analyses may also be applied to the examination of individual pairs of adjusted means, just as it was applied to the overall significance test of covariance analysis in the preceding section. When this is done it can be shown that even more precise statements can be made about the conditions under which conventional covariance analyses yield non-spurious estimates of effects in quasi-experiments. A hypothetical example may illustrate the kinds of conclusions we may be able to draw for particular pairs of treatment groups.

Suppose that we have 3 treatment groups (A, B, and C) in a quasi-experiment with appropriate measures on a pretest (X) and on a posttest (Y). Suppose further that the observed (common) within-group regression of Y on X has a slope of .4, while the regression of Y on estimated true scores on X has a slope of 1.0; and that during the interval between pretest and posttest the means for group A increase from 1.0 to 4.0, those for group B increase from 5.0 to 7.0, and those for group C decrease from 6.0 to 2.5. Figure 1 shows the three groups with the given pretest and posttest means, and with the assumed fallible (solid, diagonal lines) and true-score regressions (dashed, diagonal lines). The projections shown on the Y-axis indicate that the conventional covariance analysis would yield adjusted means of 5.2, 6.6, and 1.7, while the true-score covariance analysis would yield adjusted means of 7.0, 6.0, and .5, for groups A, B, and C, respectively.

Consider first the statements we might make concerning the differential effectiveness of treatments A and B. The fallible covariance analysis indicates that B produced a greater positive increment in scores that A, while the true-score analysis indicates that A produced a greater positive increment in scores than B. Clearly, for this pair of treatments the conventional covariance analysis is misleading.

However, a somewhat different picture emerges when we consider the differential effectiveness of A vs. C or B vs. C. The true-score analysis indicates that treatment A tends to increase scores more than treatment C, and the fallible analysis yields the same conclusion together with a conservative estimate of the effect (estimated treatment differences of 6.5 and 3.5, respectively). Similarly, the true-score analysis indicates that treatment B tends to increase scores more than treatment C, and the fallible analysis yields the same conclusion and a conservative estimate of the effect (treatment differences of 5.5 and 4.9, respectively).

Clearly it would be useful to have a general formulation which would enable us to predict when the correspondence between fallible and true-score analyses resembles the latter pattern (that illustrated by A vs. C or B vs. C), rather than the former pattern (that illustrated by A vs. B). Appendix D develops such a formulation and summarizes corroborative empirical tests of it. Only that portion of the formulation dealing with positive within-group regressions will be outlined here.

The criteria for determining whether conventional covariance analysis leads to spurious, or to directionally correct and conservative, estimates of differential treatment effects are as follows:

(a) If the observed within-group regression is positive, and the line connecting the points representing the pair of treatment means to be compared (e.g., A and B in Figure 1) has a slope algebraically greater than the within-group slope, then comparison of the two adjusted means will yield a potentially spurious estimate of differential effects.

(b) If the observed within-group regression is positive, and the line connecting the points representing the pair of treatment means to be compared (e.g., A and C or B and C in Figure 1) has a slope algebraically less than the within-group slope, then the comparison of the two adjusted means will yield a directionally correct and conservative estimate of differential effects.

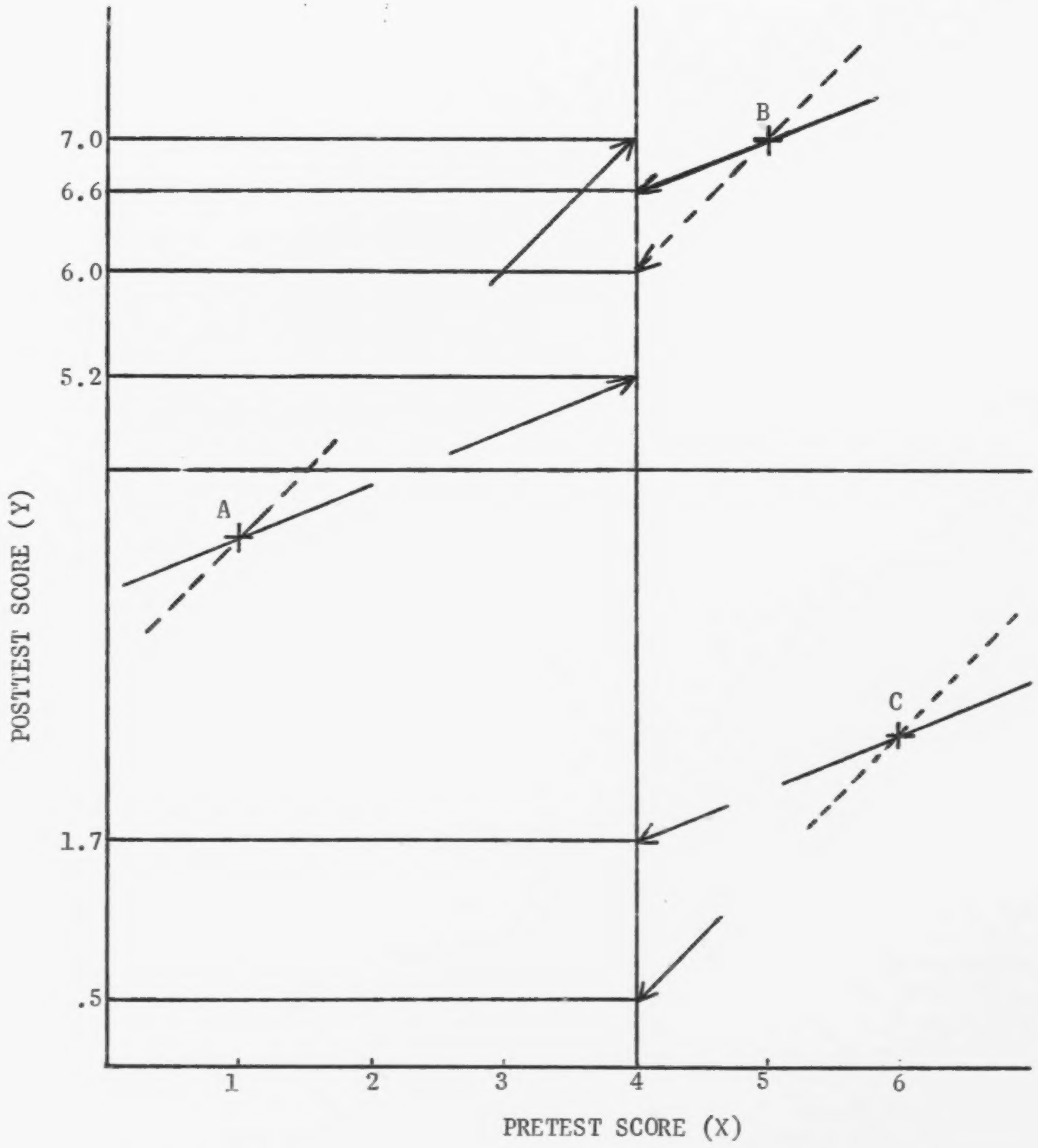


Fig. 1. Hypothetical Outcomes of Fallible and True-Score Covariance Analyses of Scores for Three Treatment Groups

Although on first reading these criteria may appear arbitrary, they can be shown to be both reasonable and consistent with empirical tests. For example, considering the A vs. C comparison, we may note that group C had a higher pretest score than group A, while group A had a higher posttest score than group C. Clearly during the interval between pretest and posttest scores have increased for group A and decreased for group C. The conclusion that treatment A increases scores more than treatment C is therefore reasonable. A more detailed examination of the rationale for, and the highly corroborative empirical tests supporting, this formulation is presented in Appendix D.[1]

The importance of these criteria is that on the basis of bivariate plots like those shown in Figure 1 it is possible to identify pairs of treatments for which conventional covariance adjustments provide directionally correct but conservative estimates of differential effects. In the next section, this technique is used to describe additional effects of entering a field of study on variables for which reliability estimates were not available.

Field Effects upon Student Aspirations and Values

In considering effects upon variables for which reliability estimates were not available, the following strategy was employed. The overall significance test provided by conventional analysis of covariance was inspected, and if this ratio did not meet the .05 significance level the relevant hypothesis was regarded as rejected. If the given F-ratio met or exceeded this level, further comparisons were made only between the members of pairs of treatments meeting the regression criteria outlined in the preceding section. Among the latter, differential effects were inferred only for those treatment pairs yielding significant F-ratios for testing the significance of the difference in adjusted means. Although this procedure yielded a conservative test of differential field effects (cf. Appendix D), it has the advantage of ruling out spurious effects arising from errors of measurement on the covariable.

---

[1] The proposed criteria are in fact a generalization of the principle of contrasting internal and external regressions when there are but two treatment groups. To the writer's knowledge no one has previously suggested the particular formulation proposed here, although there has been ample discussion of tests for the difference in the internal and external regression slopes. Cochran (14), Smith (42), and Winer (58) present alternative techniques for testing the significance of the difference between external and internal regressions in the analysis of covariance. However, Smith notes that in most texts on statistics interpretation of the internal versus external regression "is usually side stepped or at best controversial," and indicates that better examples are needed in order to clarify this analytic model (42, p.302). More recently, Porter (36, p. 13-15) independently described six hypothetical cases (all with positive within-group regressions) in which treatment means have varying types of juxtaposition, and showed how correspondence between true-score and conventional covariance adjustments varied by type of juxtaposition. It can be shown that the criteria described in Appendix D are a more general formulation of the cases described by Porter.

Aspiration. The aspiration variables were based upon responses to a question, included in each of the annual surveys, asking the student to indicate the highest level of education he expected to complete by choosing among the following categories: (a) I expect to complete three years of college; (b) I expect to get a bachelor's degree; (c) I expect to do some graduate study but not enough for an advanced degree; (d) I expect to get a Master's degree; (e) I expect to obtain a first-professional degree (M.D., D.D.S., L.L.B., or B.D); or (f) I expect to obtain a Ph.D. or other equivalent academic doctorate degree. The last two categories were regarded as representing roughly equivalent levels of education and were each was assigned the numerical value of 5, while categories a, b, c, and d were assigned the values of 1, 2, 3, and 4, respectively. The student's 1965 response yielded a pretest score, used as covariate, and his 1966 and 1967 responses yielded posttest scores, which were used as dependent variables; treatment groups consisted of fields of study as defined in the preceding sections.

Among women, neither the overall F-ratio for one-year changes (F = .98) nor that for two-year changes (F = .69) was significant, and the hypothesis that there were field effects upon the aspirations of women was rejected.

Among men, there was an F-ratio significant at the .01 level of confidence both for one-year (F = 3.05), and for two-year (F = 3.50), changes in aspirations. However, as we have already seen in Tables 17 and 18, these overall F-ratios may be spuriously inflated. When additional comparisons were made, in each analysis, between the pairs of adjusted means meeting the regression criteria described in the preceding section, none of the latter treatment pairs were found to differ significantly. Accordingly, the hypothesis of differential field effects upon the aspirations of men was rejected.

Student values. Four student value variables were defined on the basis of the respondent's ratings, on each of the annual surveys, of the importance of 12 of 13 requirements for a satisfying job or career. The variables, together with the requirements associated with each, were as follows:

1. Prosocial orientation--"provide me an opportunity to work on the application of knowledge to practical affairs," "give me opportunities to work with people rather than things," "give me an opportunity to be helpful to others."

2. *Affluence orientation*--"provide me with a chance to earn a good deal of money," "give me social status and prestige," "enable me to look forward to a stable, secure future."

3. *Intellectual orientation*--"give me an opportunity to live and work in the world of ideas," "provide me an opportunity to work on theoretical problems regardless of practical value," "permit me to be creative and original."

4. *Individualistic orientation*--"leave me relatively free of supervision by others," "give me a chance to exercise leadership," "provide me with adventure."[1]

Tables 19 and 20 summarize for men and women, respectively, all of the statistically significant comparisons between adjusted mean value scores that were non-spurious by the criteria described. In these tables a *low* adjusted mean indicates a relatively *large* increment in the given value. Field effects upon the prosocial orientations of men were as follows: health professions produced a greater increment than either fine and applied art or English; and history a greater increment than fine and applied art (Table 19). With respect to effects upon the affluence orientations of men, entry into engineering produced greater increments than entry into either fine and applied art or English. Finally, majoring in history produced a greater increment in individualistic orientations than majoring in English.

Among women, entry into nursing training (health professions) produced a greater increment in prosocial orientations than entry into English. Sociology majors exhibited greater increases in affluence orientations than majors in fine and applied art. Virtually all of the remaining differences in Table 20 involved women selecting mathematics as their major field: these women exhibited smaller increments in intellectual orientations than women specializing in education, modern foreign languages, fine and applied art, or biological sciences, and they showed smaller increments in individualistic orientations than women majoring in biological sciences, English, or fine and applied art. Finally, majors in modern foreign languages exhibited greater increments in individualism than women selecting nursing as their major field.

Are there Plausible Rival Explanations of the Results?

It is apparent that the analytic methods used in these quasi-experimental tests of hypotheses cannot, and did not, take account of

---

[1] The foregoing clusters of requirements were defined on the basis of an inspection of the correlations between ratings of requirements in 1965. One requirement--"provided me with an opportunity to use my special abilities and aptitude"--was rated important by virtually all students and was omitted from the analysis.

TABLE 19

Comparisons of Adjusted Mean Value Scores for Treatment Pairs in which Covariance Analysis is Non-Spurious (Men)

Variable	Year posttest scores were obtained	Treatment pair compared	Adjusted posttest scores[a]	Diff.	F (df = 1,640)
Prosocial orientation	1966	Health professions Fine, applied arts	5.12 6.78	1.66	9.37**
		History Fine, applied arts	5.91 6.78	.87	8.08**
		Health professions English	5.12 6.46	1.34	6.79**
Affluence orientation	1966	Engineering Fine, applied arts	4.91 5.53	.62	3.39*
		Engineering English	4.91 5.42	.51	3.39*
Individualistic orientation	1966	History English	5.45 6.31	.86	9.46**

[a] Lower adjusted means indicate greater increments in the given value.

*$p < .05$

**$p < .01$

all possible antecedent differences between treatment groups. It may therefore appear that there are numerous plausible rival explanations for the results. Cochran (14), Lord (31), and Stanley (44), whose discussions dealt mainly with observational studies, noted that even though we adjust groups for differences on a covariable, bias may be present from some disturbing variable that was overlooked. However, merely to assert that such a contingency is possible in quasi-experimental comparisons does not necessarily invalidate the covariance test of the hypothesis that "treatments" have had differential effects. In order to regard group differences on an overlooked antecedent variable as a plausible rival hypothesis, it seems necessary to show that such groups do indeed differ with respect to one or more

TABLE 20

Comparisons of Adjusted Mean Value Scores for Treatment Pairs in which Covariance Analysis is Non-Spurious (Women)

Variable	Year posttest scores were obtained	Treatment pair compared	Adjusted posttest scores[a]	Diff.	F (df = 1,511)
Prosocial orientation	1966	Health professions English	6.15 6.72	.57	5.84*
Affluence orientation	1966	Sociology Fine, applied arts	4.33 4.89	.56	3.54*
Intellectual orientation	1967	Education Math., statistics	5.62 6.38	.76	7.50**
		Mod. for. lang. Math., statistics	5.65 6.38	.73	5.85*
		Fine, applied arts Math., statistics	5.69 6.38	.69	5.22*
		Biological sciences Math., statistics	5.72 6.38	.66	4.14*
Individualistic orientation	1967	Biological sciences Math., statistics	5.69 6.75	1.06	8.01**
		Mod. for. lang. Health professions	5.56 6.28	.72	4.98*
		English Math., statistics	6.10 6.75	.65	4.11*
		Fine, applied arts Math., statistics	6.06 6.75	.69	3.88*

[a] Lower adjusted means indicate greater increments in the given value.

*$p < .05$

**$p < .01$

specific antecedent variables, and that such differences can plausibly account for the alleged treatment effects. In other words, the mere theoretical possibility that one or more rival explanations of the results may be found would not invalidate the covariance tests reported. In contrast, the demonstration that one of these potential rival explanations is plausible would invalidate such a test. Whether there are in fact any such plausible rival explanations for these treatment effects is an empirical question that can and should be investigated.

While we cannot rule out the possibility that one or more plausible rival explanations may eventually be discovered, it should be emphasized that there is no evidence that the proposed causal interpretations have any serious rival. Both the true-score covariance analyses and the clear confirmation of expected effects upon the "marker variables," faculty press for science and faculty press for humanities, lend considerable credence to these causal interpretations.

Conclusions

Partly as a consequence of the decision to enter a field of study the student is exposed to particular types of faculty and student press. The most striking differentiation in college press occurred between students majoring in the physical sciences, on the one hand, and those majoring in the humanities, on the other. Students in these two subcultures not only described the teachers they knew best in markedly different terms; they also described their close undergraduate friends very differently. The results confirm in part the development of the "two cultures"--scientific and humanistic--which C. P. Snow described some years ago. There was no evidence that entering a field of study had effects upon aspirations to seek advanced graduate or professional degrees. However, there was evidence that entering a field of study sometimes affects the student's values--particularly, his prosocial, affluence, intellectual, or individualistic values.

A series of methodological analyses demonstrated that it is possible to formulate specific conditions under which conventional covariance analysis yields non-spurious estimates of effects in quasi-experiments.

CHAPTER IV

CHANGES IN STUDENTS AND IN COLLEGE ENVIRONMENTS

Do students change, on the average, as they progress through college? Do they come to adopt higher aspirations, and do their value orientations change? Do they become more or less homogeneous? At the same time, do student perceptions of the teachers and peers they know best change? If so, what kinds of teacher and student press are stable in their level, and what kinds increase or decrease in level? Do students perceptions of their teachers and peers become more or less homogeneous with increased exposure to college?

These and similar questions are concerned with the effects, or correlates, of an independent variable which may be called "length of exposure to college." If exposure to college affects some dependent variable indicative of the student's plans, values, or ecology, then one would expect to be able to demonstrate that either the central tendency, or the variability, of scores on that variable vary with length of exposure to college. In this chapter, we shall be concerned with a similar independent variable--length of exposure to upperclass college environments. In the course of this analysis we shall consider virtually every questionnaire item or scale which was administered without changes in instructions or content on each of the three survey occasions.

In general, one might expect the analysis of changes in the variability of measures over the college years to corroborate the covariance analysis presented in Chapter III. In contrast, one might anticipate that the analysis of changes in mean levels on these same measures would be sensitive to additional college effects not revealed by the analysis in the preceding chapter. These expectations may be clarified by the illustration in Figure 2. In Part I of this figure average scores on a dependent variable for students entering two hypothetical treatments (fields), A and B, are shown, with outcomes suggesting that treatment A produced an increment, and treatment B a decrement, in scores on the given variable. The covariance procedures we have considered in the preceding chapter would probably suggest differential effects for such cases, and comparisons of the variabilities of the overall pretest and posttest scores (for example, pooling subjects in treatments A and B) should reveal that the latter is greater than the former.[1] If we consider the case illustrated in Part II of this figure we see that the test results yielded by (a) covariance analysis and (b) the criterion of an "increment in pooled variances" will not be congruent when there is a decrement in the treatment-outcome correlation: the former would affirm, and the latter deny, a causal effect in this case. However,

---

[1] I am indebted to Campbell and Clayton (12) and to Donald T. Campbell (personal communication) who first suggested that an increment in pooled variance may be one additional symptom of causal effects.

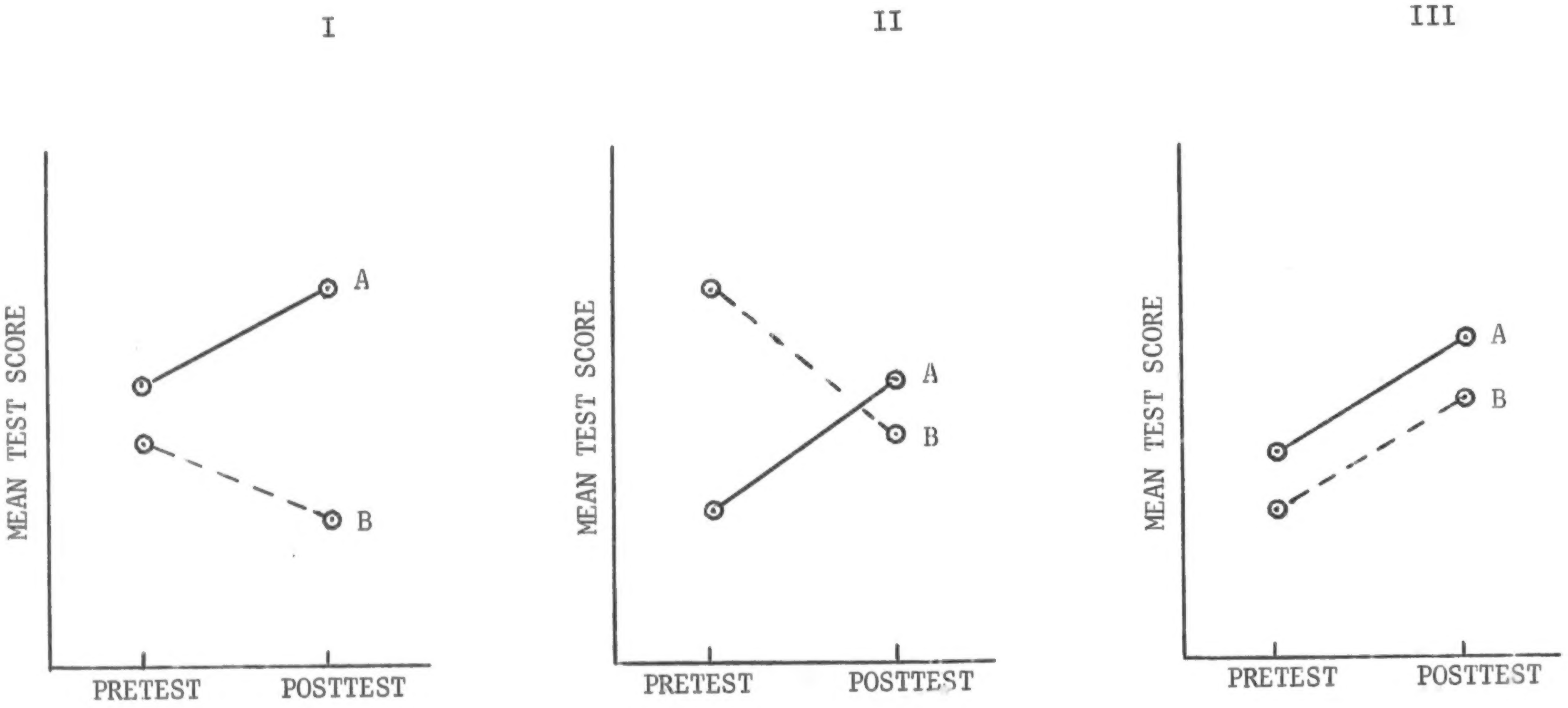


Fig. 2. Hypothetical Differences between Treatment Groups on Pretest and Posttest Measures

to the extent that increments in treatment-outcome correlations are the rule (and decrements the exception) one might expect to find generally that whenever treatment effects are demonstrable on a given variable by overall F-ratios from covariance analysis, there is a parallel increment in the pooled variance of scores from pretest to posttest. In contrast, in the case illustrated in Part III of Figure 2 we assume that there is no change in the pooled variances from pretest to posttest and no effects that would be diagnosed by covariance methods, though there is a marked elevation in score levels from pretest to posttest. The latter outcome suggests that exposure to whatever it was that intervened between pretest and posttest may ~~be~~ have produced elevated scores in both groups. In other words, colleges may have effects upon students which do not vary appreciably by field of study. To be sure, comparisons of the pretest and posttest means for the pooled groups would not tell us what specific factors occurred within the pretest-posttest interval to produce the effects. Nonetheless it is clear that a method of detecting changes in average scores of panel members may suggest complex causal effects not revealed in the earlier covariance analyses (which were concerned solely with identifying differential field effects).

The purpose of this chapter is twofold: first, it seeks to evaluate the validity of the criterion of an increment in pooled variance as a symptom of experimental effects; second, it seeks to cast a wider net for capturing potential college effects. With respect to the latter, we would like to identify changes which college students exhibit, regardless of whether all of these changes can be shown to be the consequences of exposure to college. In Chapter V we shall consider an additional type of analysis designed to identify more specific kinds of experiences that may cause changes in dispositions to seek advanced graduate or professional training.

Changes in Variabilities in Student and College Measures

We have already seen that--given the rule that there is usually an increment in the treatment-outcome correlation--there is some reason to believe that changes in overall variabilities on the student and college measures will reflect roughly the same kinds of changes already discussed in Chapter III. The methodological analysis evaluating the validity of an increment in pooled variance as an indicant of causal effects is considered first, and next the substantive results of changes in the homogeneity of students or of their environments are discussed.

Increment in pooled variance as a criterion of causal effects. On each college press scale the differences in the standard deviations of the scores obtained by all 655 men on the pretest and on each of the posttests was calculated. Similar differences were calculated for the 523 women. Differences using the 1966 posttest scores refer to differences over a one-year interval, while those using the 1967 posttest scores refer to differences over a two-year interval. For each sex and for each interval, these differences were correlated with the F-ratios obtained from the true-score covariance analyses described in the preceding chapter. Table 21 summarizes the obtained correlations, and compares them with those obtained when the latter F-ratios were correlated with increments in treatment-outcome correlations and with F-ratios from the fallible covariance analyses discussed in Chapter III. It can be seen that expectations concerning the validity of the criterion of an increment in pooled variance were unconfirmed. The latter criterion was decidedly poorer than either of the other two criteria shown in Table 21.

TABLE 21

Comparisons between Alternative Criteria of Causal Effects

	Correlation of given criterion with F-ratio from true-score analysis of covariance[a]			
	Men		Women	
Criterion	One-year	Two-year	One-year	Two-year
Increment in pooled variance	.25	-.03	-.03	.44
Increment in treatment-outcome correlation	.90	.90	.87	.79
F-ratio from fallible analysis of covariance	.94	.95	.96	.91

[a] Correlations are based on an N of 23, since outcomes were compared on each of the college press variables.

How can these results be explained? In the case illustrated in Part I of Figure 2 the expectations were based upon a number of assumptions, and it is possible that one (or more) of these assumptions was not satisfied. First, as we pointed out, the logic of using an increment in pooled variance as a symptom of causal effects assumes that there is an increment in the treatment-outcome correlation. Second, it was implicitly assumed that the average within-group variability would be relatively constant from pretest to posttest. More particularly, it was assumed that the variabilities of pretest and posttest scores within extreme-scoring treatments would be relatively constant. Suppose, for example, that treatment A in Part I of Figure 2 (or more generally, the treatment groups tending to score highest on both the pretest and the posttest) manifested a decrease in within-group variability from pretest to posttest. Suppose also that treatment group B (or treatment groups tending to score lowest on both pretest and posttest) manifested a decline in variability of scores from the initial to the final test. The results would then be that the criterion of an increment in pooled variance would not be a sensitive indicant of treatment effects.

To ascertain whether failure to satisfy the second assumption played any part in the poor performance of the variance criterion, the scores of students in extreme-scoring fields of study were examined on two scales, each of which yielded a significant F-ratio in the true-score covariance analysis and yet manifested *decrements* in pooled variance from pretest to posttest. On each of these scales a single field tended to be the highest-scoring field on both the pretest and the posttest, while a different field was the lowest-scoring on both pretest and posttest. As expected, on each scale the high-scoring and low-scoring fields had lower variabilities on the posttest than on the pretest. For example, on the scale for assessing faculty press for advanced training men majoring in chemistry or physics were high-scoring both in 1965 and in 1967, and during this interval the standard deviation of their scores decreased from 4.39 to 3.49, while the standard deviation of scores of men in fine and applied arts--the lowest-scoring field--decreased from 5.33 to 3.49 during the same interval. Similarly, on the scale for assessing student press for estheticism, women majoring in fine and applied arts were the highest-scoring group both in 1965 and 1967, and the standard deviation of their scores decreased from 4.47 to 4.13 during this interval, while the standard deviation of scores of women taking nursing--the lowest-scoring field on both occasions--decreased from 4.39 to 3.95 during this interval. In other words, students in these extreme-scoring fields tended to report a more homogeneous press for their senior year in college than for their sophomore year in college. Such effects are, of course, to be expected as the student specializes more and more in his field of study. However, the latter tendency will cause havoc for the criterion of pooled variance whenever particular treatment groups tend to be extreme in a given direction on both the pretest and posttest. In any case, it was concluded that the criterion of an increment in pooled variance was not a dependable symptom of differential field effects. One implication of this conclusion is that one would not expect changes in variabilities of student scores to provide a simple replication of the field effects discussed in Chapter III.

Changes in homogeneity on student measures. Scales for assessing degree aspirations and intellectual orientations were the only two measures of student aspirations and values which revealed statistically significant changes in the variability of scores from the pretest to the posttest. Responses to the degree aspiration question were scored in the manner described in the preceding chapter. Among men, there was a decrease in the standard deviation of aspiration scores from 1.09 to .90 over the two-year interval ($t = 6.03$, $p < .01$), while among women there was a decrease from 1.03 to .83 over the same interval ($t = 5.95$, $p < .01$). As we shall see in a later section, these changes were accompanied by increments in average aspiration levels, and the simplest interpretation of these changes in variability is that "ceiling effects" on the aspiration scale curtailed variability on the posttest measure.

It was found that women, over the two-year interval, tended to become more homogeneous with respect to their intellectual orientations. The standard deviation of their scores decreased from 1.34 to 1.23 ($t = 2.36$, $p < .05$). It will be recalled that the value scores discussed in the preceding chapter were derived from importance ratings of clusters of job requirements considered in evaluating a satisfying job or career. The job requirement most characteristic of the intellectual cluster (i.e., showing the highest average correlation with other members of the cluster) was "give me an opportunity to live and work in the world of ideas." The results suggest that women were somewhat more homogeneous with respect to ratings of the importance of such requirements after completing the senior, than after completing the sophomore, year.

Changes in homogeneity on college press measures. The college press factors discussed in Chapter II are useful in summarizing the changes exhibited in the homogeneity of scores on the faculty and student press scales. It will be recalled that 9 of the press scales had their highest loadings on three oblique factors interpreted as _faculty rapport_ factors. These 9 scales have been grouped together at the top of Table 22, which summarizes changes in the variabilities of scores obtained in 1965 and in 1967. It can be seen that generally scores on faculty rapport scales did not change with respect to variability. The two exceptions to this generalization were that, over the two-year interval, men tended to become more heterogeneous with respect to scores on the scale, Student Opposition to Faculty Influence, and with respect to scores on the scale, Faculty Press for Independent Thinking.

The changes in variability on the scale defining the second factor, faculty exactitude, were consistent for both sexes. The results indicate that student descriptions of the extent to which faculty members demanded strict compliance with regulations were more heterogeneous for teachers known in the senior year than for those known in the sophomore year.

Virtually all of the significant differences shown in Table 22 for scales associated with factors C, D, E, and G can be accounted for by the effects of entering specialized fields of study. Thus the F-ratios for true-score covariance analyses in Tables 17 and 18 indicate that the effects of entering different fields of study were, for the most part, like those illustrated in Part I of Figure 2, and no further assumptions are required to account for the observed overall changes in variability on these scales.

For both men and women, descriptions of the playfulness of close student colleagues were more heterogeneous after the senior, than after the sophomore, year. Finally, among men descriptions indicating the extent to which close peers exerted press for affluence or for academic achievement were more heterogeneous at the end of college than they were at mid-college. There is no readily apparent explanation for the latter changes. We have already seen in Chapter III that there were no effects on these scales associated with entering specialized fields of study, and we shall see in the next section that there were no consistent changes in mean score levels on these scales.

TABLE 22

Changes in Variability of College Press Scores of Men and Women

Factors and Associated Press Scales	Men (N = 655) Standard deviation of scores 1965 (Soph.)	1967 (Senior)	Diff.	t^a	Women (N = 523) Standard deviation of scores 1965 (Soph.)	1967 (Senior)	Diff.	t^a
A - Faculty rapport factors								
12-Affiliation	4.5	4.6	.1	--	5.1	4.8	-.3	-1.50
8-Advanced training	4.1	4.0	-.1	--	4.2	4.3	.1	--
4-Independent thinking	3.9	4.2	.3	2.09*	4.3	4.4	.1	--
6-Evaluations of ability	3.9	4.1	.2	1.38	4.3	4.1	-.2	-1.63
2-Supportiveness	4.2	4.1	-.1	--	4.5	4.4	-.1	--
10-Adequacy as positive role models	4.5	4.6	.1	--	4.4	4.6	.2	--
1-Enthusiasm for intell. values	3.7	4.0	.3	1.87	3.9	3.7	-.2	-1.55
11-Excellence of teaching	4.3	4.5	.2	1.72	4.6	4.6	--	--
20-Opposition to faculty infl.	3.7	4.1	.4	2.69**	4.0	4.1	.1	--
B - Faculty exactitude								
5-Compliance	4.0	4.6	.6	3.60**	4.1	4.6	.5	2.95**
C - Faculty humanism								
7-Humanities	4.4	4.7	.3	2.12*	4.0	4.5	.5	2.80**
D - Faculty scientism								
9-Science	3.3	3.5	.2	1.55	3.0	3.4	.4	3.30**

TABLE 22--Continued

Scale	Men				Women			
	1965	1967	Diff.	t^a	1965	1967	Diff.	t^a
E - Faculty and student vocationalism								
3-Faculty vocationalism	4.3	4.6	.3	1.79	4.1	4.5	.4	2.63**
15-Student vocationalism	3.4	4.0	.6	5.07**	3.5	3.7	.2	1.55
F - Student humanism								
13-Estheticism	5.0	5.3	.3	1.39	4.7	4.7	--	--
16-Reflectiveness	4.9	5.1	.2	--	4.6	4.6	--	--
21-Intellectualism	4.4	4.3	-.1	--	4.1	3.9	-.2	-1.54
G - Student scientism and professionalism								
19-Science	5.0	5.4	.4	2.32*	4.8	5.0	.2	1.70
18-Advanced training	4.4	4.6	.2	1.34	4.4	4.6	.2	1.49
H - Student competition								
17-Unfavorable self-evaluation	3.6	3.7	.1	--	3.8	3.9	.1	1.06
I - Student playfulness								
28-Playfulness	4.1	4.4	.3	1.98*	4.0	4.4	.4	2.63**
J - Student affluence								
22-Affluence	3.7	4.0	.3	2.60**	3.8	3.8	--	--
K - Student achievement								
14-Academic achievement	3.6	4.0	.4	3.01**	3.7	3.6	-.1	--

[a] _t_-ratios having values of less than 1.0 are omitted.

$^{*}p < .05$

$^{**}p < .01$

Changes in Average Levels on Student and College Measures

Aspirations and related attitudes. Among men, there was only a trivial change in the average aspiration level from the first to the second survey (4.01 and 4.02, respectively); however, the difference between the initial level and the terminal level (4.20) was highly significant ($t = 5.28$, $p < .01$). Among women, there was a tendency for aspirations to increase almost as much during the junior, as during the senior, year of college. The mean scores for women for the initial, middle, and terminal surveys were 3.17, 3.37, and 3.65, respectively; the one-year gain was highly significant ($t = 5.71$, $p < .01$) as was the two-year gain ($t = 12.10$, $p < .01$).

The percentages of panel members making specific aspiration responses on each survey are shown in Table 23, and reveal essentially the same pattern shown by average levels of scale scores. Approximately 82 per cent of the men planned at least some graduate study after college graduation both on the first and second surveys, but by the completion of the senior year 92 per cent reported such plans. In contrast, the percentages of women with such plans were 63, 71, and 88 on the initial, middle, and terminal surveys, respectively.

As the panel progressed through college an increasing percentage of respondents reported that their close friends were planning to go on to graduate or professional studies. Table 23 shows that the combined percentage of men indicating either that "all or almost all" or "more than half" of their close friends were planning such studies increased from 46 to 63 per cent during the last two years of college. The corresponding percentages for women were 25 and 44.

An extraordinarily high percentage of both men and women expressed confidence that they had the ability to successfully pursue an advanced graduate or professional degree: the percentage of men expressing such confidence increased from 95 to 99 during the interval between initial and final surveys; during the same period the percentage of women expressing such confidence increased from 92 to 96 (Table 23). Judging by the college grade-point averages reported on each survey, the level of confidence displayed by the men (if not by the women) was probably unrealistically high. The percentage of men reporting an overall grade-point average for the first two years of college which had a letter grade equivalent of B- or higher was only 49; the corresponding percentage for women was 61. To be sure, there was a tendency for grades to improve during the upperclass years: 68 per cent of the men and 80 per cent of the women reported averages at least this high for the junior year; 76 per cent of the men and 88 per cent of the women reported averages at least this high for the senior year. Yet it is clear that about a quarter of the men reported C averages during their senior year and at the same time expressed some confidence in being able to successfully pursue an advanced degree.

TABLE 23

Changes in Aspirations and Related Attitudes During the College Years

Question and response	Men (N = 655) 1965	Men (N = 655) 1966	Men (N = 655) 1967	Women (N = 523) 1965	Women (N = 523) 1966	Women (N = 523) 1967
What are your educational plans for the future? (Indicate the highest level of education you expect to complete.)						
Three years of college	--	--	--	1	--	--
Bachelor's degree	17	18	8	37	27	12
Some graduate study	5	5	7	16	18	23
Master's degree	35	34	41	39	47	54
First-professional degree	25	25	23	2	2	1
Academic doctorate	17	18	21	6	7	10
Of your close friends in college, how many are planning to go for graduate or professional studies? (choose one)						
All or almost all	18	29	35	7	16	16
More than half	28	35	28	18	27	28
Less than half	28	21	23	31	30	29
Few or none	15	12	11	32	23	23
Don't know	11	3	2	12	5	4
In your opinion, do you have the ability to successfully pursue a graduate or professional degree?						
No	1	--	--	2	1	1
Probably No	4	4	1	6	5	2
Probably Yes	34	33	25	46	41	34
Yes	61	63	74	46	52	62

Percentage making given response on each survey

Changes in student values. The value changes of greatest magnitude were the increases in individualistic orientations shown by both men and women (Table 24). The job requirement most characteristic of the individualistic cluster was "leave me relatively free of supervision by others," and these changes may be interpreted as indicating that college students tend to become increasingly impatient with roles in which they are exposed to surveillance.

Table 24

Changes in Average Value Scores of Men and Women

	Men (N = 655)				Women (N = 523)			
	Mean scale score				Mean scale score			
Value score[a]	1965	1967	Diff.	t	1965	1967	Diff.	t
Individualistic orientation	6.2	5.7	.5	7.70**	6.5	6.2	.3	5.27**
Prosocial orientation	5.9	6.1	-.2	-3.17**	6.5	6.7	-.2	-3.71**
Affluence orientation	5.2	5.0	.2	2.84**	4.6	4.5	.1	1.92
Intellectual orientation	6.0	6.0	--	1.30	5.8	5.9	-.1	-1.87

[a] On the value scales low scores indicated stronger value orientations. Since 1967 scores were subtracted from 1965 scores, positive differences in this table represent increments, and negative differences decrements, in the given value.

**$p < .01$

Coupled with the rise in individualism was a decline in altruism. Both men and women exhibited statistically significant decreases in prosocial orientations. The job requirement most characteristic of the latter cluster was "give me an opportunity to be helpful to others." Hence the results may be interpreted as indicating that college (or some other time-related factor) caused students to place less importance upon the opportunity to be helpful to others in considering a satisfying job or career.

Finally, there was a significant increment in the affluence orientations of men. The job requirement best epitomizing the affluence cluster was "provide me with a chance to earn a good deal of money." It may be seen that women exhibited a similar increase in the importance they placed on money, but this change was only of borderline significance ($p < .06$).

College press. Table 25 summarizes changes in average college press scores. It can be seen that on 7 of the 9 faculty rapport scales both men and women exhibited highly significant two-year gains in average scores. It seems clear that during the interval between completing the sophomore and senior years panel members showed a striking increase in faculty rapport. Table 25 shows that the largest increment in press reported by men was on the scale, Faculty Press for Affiliation. We saw in Chapter II (Table 7) that the most characteristic item in this scale (i.e., the item having the largest factor pattern coefficient) was "They took a personal interest in me and my work." The percentage of men either strongly or mostly agreeing with this item increased from 38 to 53 during the interval from the initial to the final survey. Among women the largest increment in press was manifested on the scale, Faculty Press for Advanced Training. The percentage of women agreeing with the most characteristic item on this scale, "They encouraged students to do graduate study," increased from 48 to 65. But the differences between the sexes were relatively minor; perhaps the most impressive aspect of Table 25 is the fact that the overall ecological changes with respect to faculty rapport were virtually identical for men and women. For both sexes the largest increments in faculty press were on the scales for assessing the extent to which the faculty expressed affiliation, supportiveness, favorable evaluations of the student's ability, and strong press for advanced training or independent thinking.

Although there were very marked changes in the rapport students enjoyed with the teachers they knew best, there were no corresponding increases in the average ratings of teaching excellence given these teachers. These findings do not support the hypothesis of a "halo effect" in student descriptions; on the contrary, they suggest that panel members were discriminating in descriptions of their teachers.

Virtually all of the changes on the faculty rapport scales are congruent with the hypothesis that men and women become increasingly disposed to look upon their teachers as appropriate role models as they progress through college. Figures 3 and 4 show that changes in average scores on these scales tended to be a function of the length of exposure to upperclass instruction. Also Figure 3 shows that men tended to exhibit positively accelerated growth curves with respect to faculty rapport, while Figure 4 shows that women tended to exhibit negatively accelerated growth curves in this same factor of college press. This difference between the sexes in the rate with which faculty rapport seems to change during the upperclass years may be related to the finding discussed earlier that women, but not men, tended to change their degree aspirations during the junior year of college. One interpretation of these results is that women tend, at an earlier developmental stage than men, to regard their teachers as appropriate role models, and as a consequence their dispositions to seek advanced training tend to change at an earlier point in the college years.

Other changes in average scores on the faculty press scales shown in Table 25 can be summarized as follows: for both men and women there

TABLE 25

Changes in Average College Press Scores of Men and Women

Factors and Associated Press Scales	Men (N = 655) Mean scale score 1965 (Soph.)	Men (N = 655) Mean scale score 1967 (Senior)	Men Diff.	Men t	Women (N = 523) Mean scale score 1965 (Soph.)	Women (N = 523) Mean scale score 1967 (Senior)	Women Diff.	Women t
A - Faculty rapport factors								
12-Affiliation	18.9	20.9	2.0	10.89**	19.6	21.2	1.6	6.60**
8-Advanced training	20.4	21.8	1.4	8.89**	19.9	21.7	1.8	9.25**
4-Independent thinking	18.6	20.1	1.5	8.73**	19.3	20.3	1.0	5.47**
6-Evaluations of ability	19.2	20.6	1.4	8.30**	19.8	21.4	1.6	8.48**
2-Supportiveness	19.7	20.9	1.2	7.09**	19.9	21.3	1.2	5.78**
10-Adequacy as positive role models	21.0	21.8	.8	4.91**	21.9	22.4	.5	2.42*
1-Enthusiasm for intell. values	22.8	23.3	.5	3.47**	23.4	23.9	.5	3.17**
11-Excellence of teaching	20.8	20.8	--	- .21	20.9	20.9	--	.11
20-Opposition to fac. infl.	18.6	18.3	- .3	- 1.56	17.4	17.2	- .2	-1.00
B - Faculty exactitude								
5-Compliance	19.9	17.8	-2.1	-11.53**	19.8	18.2	-1.6	-8.14**
C - Faculty humanism								
7-Humanities	20.4	20.6	.2	1.13	21.9	21.9	--	.22
D - Faculty scientism								
9-Science	20.7	20.8	.1	.69	20.9	20.6	- .3	-2.05*
E - Faculty and student vocationalism								
3-Faculty vocationalism	19.6	19.0	- .6	- 3.61**	19.7	19.3	- .4	-2.23*
15-Student vocationalism	19.7	19.1	- .6	- 4.49**	19.5	19.9	.4	2.46*

TABLE 25--Continued

Scale	Men 1965	Men 1967	Men Diff.	Men t	Women 1965	Women 1967	Women Diff.	Women t
F - Student humanism								
13-Estheticism	16.8	18.0	1.2	6.51**	20.4	20.9	.5	2.54*
16-Reflectiveness	18.1	18.9	.8	4.57**	20.2	20.0	-.2	-1.01
21-Intellectualism	20.3	20.9	.6	3.38**	22.1	21.9	-.2	-1.27
G - Student scientism and professionalism								
19-Science	16.6	17.0	.4	2.00*	14.4	14.4	--	.20
18-Advanced training	20.0	21.0	1.0	6.39**	19.1	19.6	.4	2.21*
H - Student competition								
17-Unfavorable self-evaluations	16.1	15.5	- .6	-4.30**	15.8	14.9	-.9	-5.87**
I - Student playfulness								
23-Playfulness	20.2	21.1	.9	5.64**	20.9	21.1	.2	1.17
J - Student affluence								
22-Affluence	16.0	15.9	- .1	- .43	14.7	14.2	-.5	-3.06**
K - Student achievement								
14-Academic achievement	19.4	19.5	.1	.45	19.9	20.1	.2	1.31

*$p < .05$

**$p < .01$

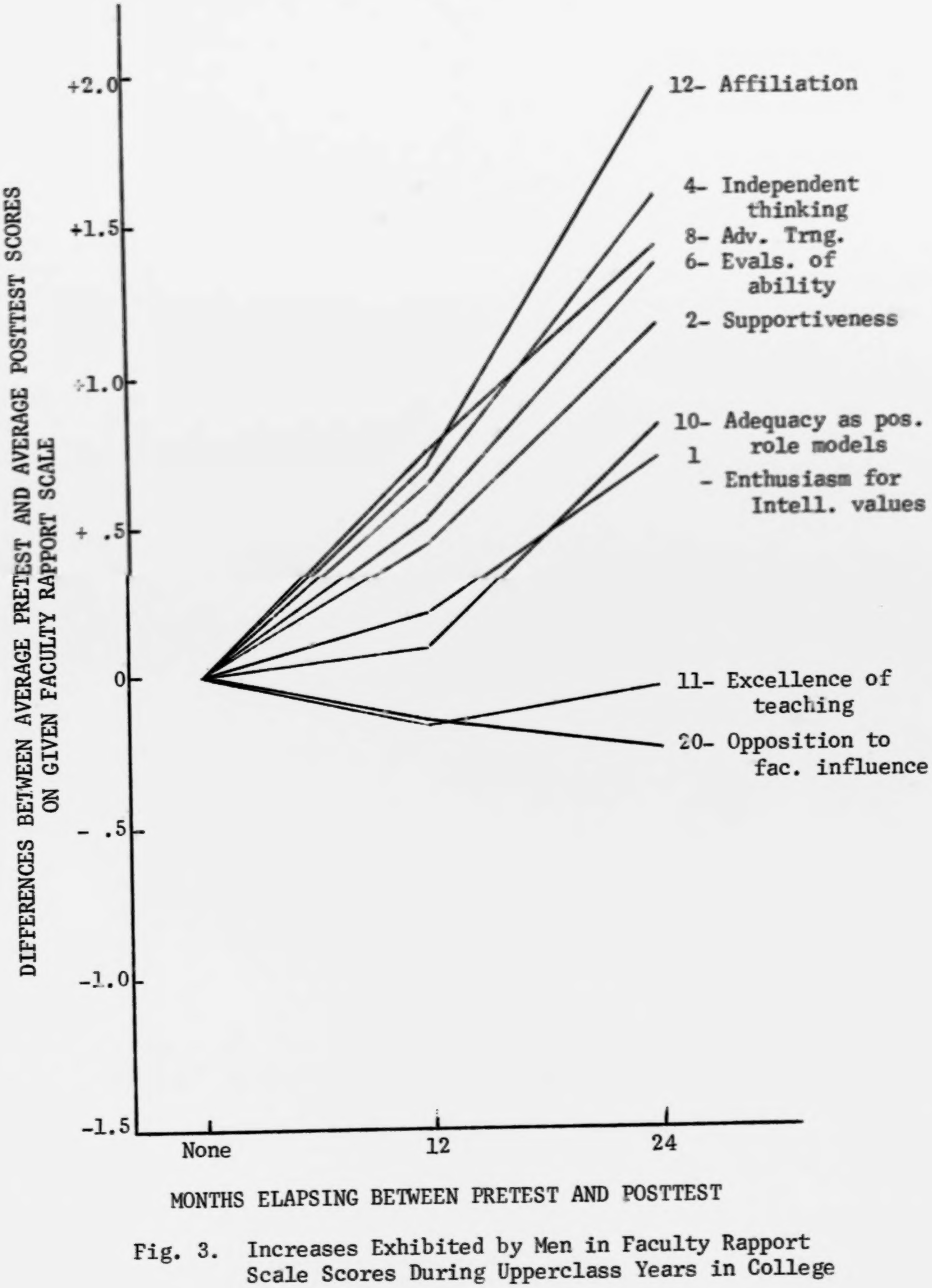


Fig. 3. Increases Exhibited by Men in Faculty Rapport Scale Scores During Upperclass Years in College

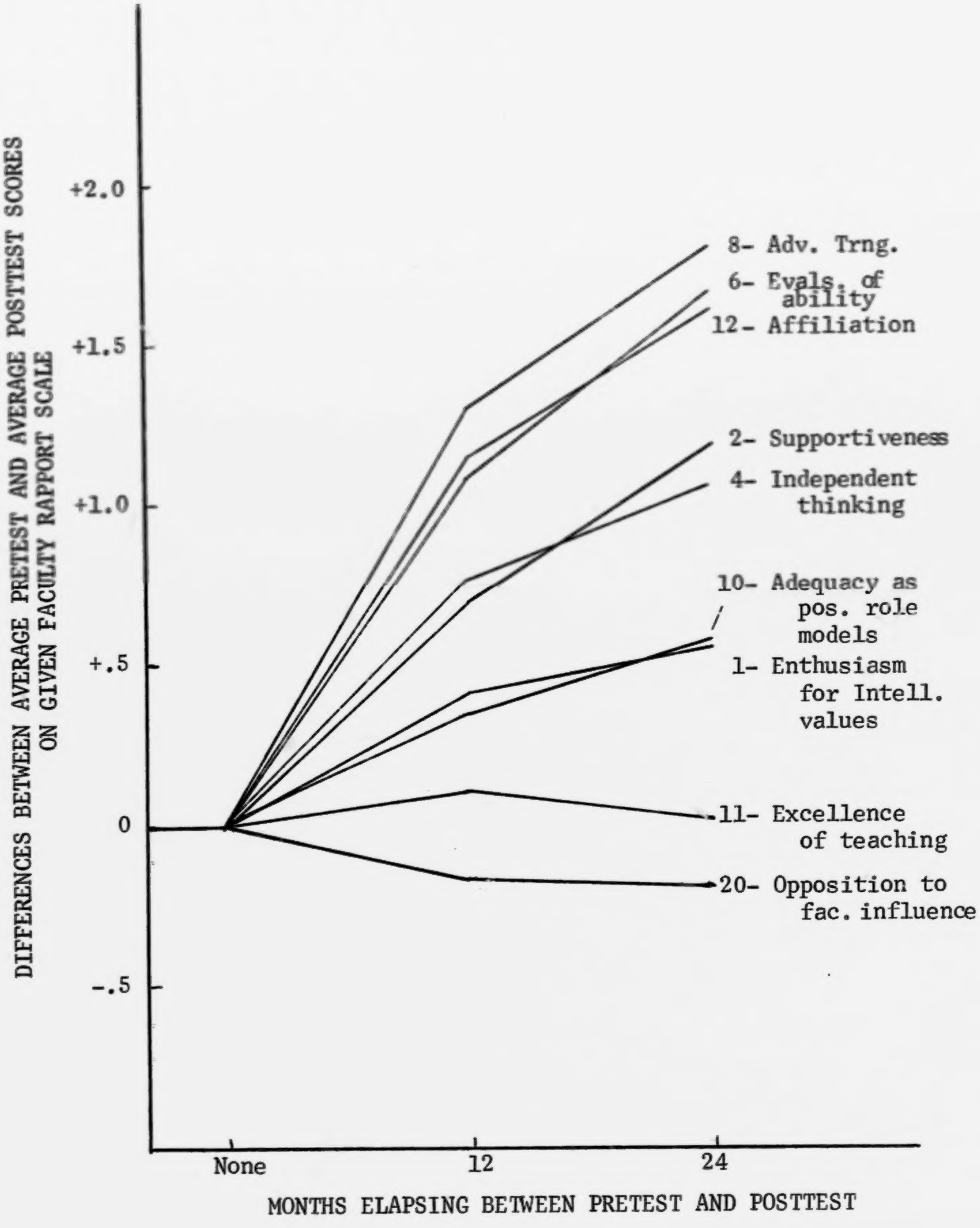


Fig. 4. Increases Exhibited by Women in Faculty Rapport Scale Scores During Upperclass Years in College

was a marked decrement in faculty exactitude (press for compliance) and a somewhat smaller decrement in faculty press for vocationalism. With respect to the parallel student scale, Student Press for Vocationalism, men exhibited a decline, but women a gain, in average scores.

Two of the remaining changes in student press have already been intimated by changes in responses to single questionnaire items. Table 23 shows that there was both an increase in the percentage of close friends planning to do graduate study and a moderate increase in the percentage expressing confidence in their ability to successfully pursue graduate study. Similarly, Table 25 indicates that for both men and women there were increases in student press for advanced training and decreases in student press for unfavorable self-evaluations.

After the completion of the sophomore year, men exhibited markedly lower scores than women on the student humanism scales (estheticism, reflectiveness, and intellectualism), but during the upperclass years men tended to reduce the gap. During the last two years of college men showed significant increases, while women showed relatively little changes in scores on the student humanism scales. At the same time, there was an increase in student press for playfulness among men.

Finally, there was a decrease in student press for affluence among women. Apparently, changes on the affluence items were small but consistent, and they suggest that the close student colleagues of our female panel members were perceived to be slightly less affluent at the end of college than two years earlier. For example, there was only a small decrease (16 vs. 13 per cent) in the percentage of women agreeing with the most characteristic item on this scale, "They were accustomed to having plenty of money." Perhaps this change is related to the facts that women during the course of the study increasingly elected to describe students met in the their major field of study and less frequently described students met in their dormitories (cf. Table 12), and education was the major field of study for 1 out of every 10 of the female panel members. The final link in this account would of course be the assumption that education tends to recruit its majors from students of relatively modest means.

Conclusions

The degree of rapport panel members enjoyed with faculty members increased with length of exposure to upperclass instruction. Student descriptions of their college environments indicate that there were, from the initial to the final survey, large increments in faculty affiliation, supportiveness, regard for the respondent's ability, and press for advanced training and independent thinking. Women as well as men exhibited increases in degree aspirations over the two-year interval, and by the completion of college 9 out of every 10 of the panel members planned to do at least some graduate study. Accompanying these changes in personal plans were increases in the percentages of students reporting that their close friends planned to pursue graduate work. In addition, both men and women exhibited increases in individualistic, and decreases in prosocial, orientations. Many of these results are consistent with the hypothesis that during the later college years students are exposed to modeling stimuli from teachers and peers which increasingly argue for the appropriateness of advanced graduate or professional training, and as a consequence exhibit changes in related plans and attitudes.

Descriptions of the teachers and peers known best by panel members became more heterogeneous as students progressed through college: from the initial to the final survey there were increases in the variabilities of scores on scales for assessing faculty press for compliance, humanities, science, and vocationalism and for assessing student press for vocationalism, science, and playfulness. Many of these increases in heterogeneity of the college press reported appear to be the consequences of increased specialization in the major field of study.

It was concluded that the criterion of an increment in pooled variance was not a valid symptom of differential treatment effects.

CHAPTER V

COLLEGE EXPERIENCES AND CHANGES IN DISPOSITIONS TO SEEK ADVANCED TRAINING

We saw in Chapter III that there was no evidence that entering specialized fields of study had differential effects upon plans to seek advanced graduate or professional degrees. Yet the results in the preceding chapter indicate that there were consistent increments in degree aspirations for both men and women, and that there were more or less concomitant changes in faculty and student press and in student values. These two sets of results are, of course, entirely compatible, and they suggest the possibility that there are ecological changes in the later college years, more or less common to all fields of study, that may affect student dispositions to seek advanced training. In this chapter we shall discuss tests of the general hypothesis that college press and other experiences during the last two years of college in part caused changes in student dispositions to seek advanced training.

Effects of College Press upon Changes in Dispositions

We shall consider first a methodological analysis designed to clarify the interpretation of results, and then discuss tests of the hypothesis that faculty and student press affect motivation for advanced training.

Estimating effects by partial correlations. The general strategy was to correlate changes in degree aspirations with college press reported at the end of the junior and senior years, holding initial aspirations constant. Lord (29) describes a hypothetical example which was persuasive in leading us to prefer a partial correlation approach as the means of studying the relationships of interest:

> (Suppose) we are anxious to increase the weight of...students and we wish to know whether adding vitamins to their diet will achieve this result. We discover that the amount of vitamins eaten is uncorrelated with gain in weight for the *total* group but that it is positively correlated with gain in weight for every subgroup of the total group. What do we conclude as to the value of the use of vitamins?....The conclusion suggested by the data would be that the addition of vitamins to the diet *does* tend to produce a gain in weight, even though amount of vitamins given is uncorrelated with gain in weight in the total group....The conclusion is that when one wishes to study the effect of some outside variable on gain in weight, or on gain in test score, the ordinary correlation between the outside variable and gain is *not* the coefficient of primary interest. For reasons that arise from the logic of the problem rather than from any purely statistical considerations, the decisive coefficient is the partial correlation between the third variable and final status, with initial status held constant. Partial correlation techniques seem to have been neglected in many cases where they are required (29, pp. 444-445).

Lord initially pointed out, and has recently re-emphasized, that the zero-order correlations entering into such partial correlations must be corrected for attenuation:

> We frequently can get along without correcting an ordinary correlation...for attenuation because we know in advance the general effect of the correction--it will make the correlation a little larger in absolute magnitude. Unfortunately, we cannot usually know in advance the effect of correcting a partial correlation for attenuation; the correction may easily change even the sign of the partial. In view of this, we can hardly afford to neglect the correction for attenuation (31, p. 36).

Guilford (20, pp. 400-401) and Lord (31, p. 35) have summarized the appropriate formulas for correcting the partial correlation for attenuation due to errors of measurement in both initial and final status.[1] Following this approach, we are interested in the partial correlation between each college press score and estimated true scores on the final criterion measure of disposition to seek advanced training, holding constant estimated true scores on the initial measure of this disposition.

Criterion measures of final dispositions to seek advanced training. Two criterion measures were available from responses to the final survey: the first, called the aspiration criterion, was the highest degree level to which the respondent aspired, as scored by the procedures described in Chapter III; the second, which will be called the entry criterion, consisted of the dichotomous attribute of entering (scored 1) or not entering (scored 0) a graduate or professional school in Fall, 1967 (cf. question 1, Survey No. 3, Appendix B). Although the question concerning plans for the coming Fall was the primary one used in diagnosing entry, responses to additional items were inspected for consistency: for example, a few students said they had entered, but had not applied for admission to any, graduate or professional school (question 3), and also answered the questions regarding reasons why they were not pursuing graduate study (questions 21-23); these students were scored as not immediately entering a graduate or professional school. Undoubtedly, some of the respondents were delaying their entry into graduate study, for 43 per cent of the women and 25 per cent of the men indicated that they were planning to pursue graduate study, but not immediately (question 21). Thus while about 9 out of every 10 of these students said they were planning to do at least some graduate work, only 27.9 per cent of the women, and 56.5 per cent of the men, were diagnosed as entering graduate or professional school immediately. The produce-moment correlations between the aspiration and entry scores were .58 and .42 for men and women, respectively.

---

[1] The description of the formula for correcting for attenuation in both X and Y scores given by Bereiter (9 , pp. 8-9) is erroneous since it omits $1/r_{XX}$ from the denominator.

Measures of initial disposition to seek advanced training. It is apparent that the student's initial disposition to seek advanced training is inadequately mirrored in his response to the single questionnaire item asking for stated degree aspirations in 1965, and that a wider array of responses to related questions may yield a more reliable estimate of the strength of the initial disposition. Accordingly, weighted, linear combinations of scores on selected predictor variables were derived by multiple-regression equations for predicting each of the criterion measures. From initial survey returns 34 predictor variables were derived: 11 of these were based upon responses to biographical questions concerning (a) initial degree aspiration level, (b) number of close friends planning graduate or professional study, (c) reported grade-point average during the first two years' of college, (d) reported grade-point average of closest friend at college, (e) confidence in ability to successfully pursue graduate study, (f) number of scholarships applied for at time of high school graduation, (g) reported rank in high school graduating class, (h) participation in honors programs in college, (i) occupational level of father or guardian, (j) mother's educational level, and (k) father's educational level; and the remaining 23 consisted of college press variables based upon 1965 responses to the scales already described. Table 26 summarizes the correlations and the proportions of criterion variance predictable on the basis of (a) the single best predictor (which was invariably initial degree aspiration level, (b) the weighted combinations of the 7, 8, or 9 predictors accounting for the largest proportions of criterion variance, and (c) the weighted combination based upon the entire set of 34 predictors. The specific predictors included in the linear combinations of 7, 8, or 9 predictors are listed in Appendix E.

TABLE 26

Correlations between Predicted and Obtained Criterion Measures

Number of 1965 Predictors used in deriving predicted criterion score	1967 Criterion	Correlation: Multiple or Zero-order	Proportion of Criterion Variance Associated with Predicted Score
	I. Women (N = 523)		
1	Aspiration	.538	.29
7	Aspiration	.568	.32
34	Aspiration	.590	.35
1	Entry	.345	.12
8	Entry	.433	.19
34	Entry	.477	.23
	II. Men (N = 655)		
1	Aspiration	.576	.33
9	Aspiration	.613	.38
34	Aspiration	.631	.40
1	Entry	.474	.22
9	Entry	.568	.32
34	Entry	.585	.34

The reliability of each of the weighted, linear composite scores was estimated by a formula given by Nunnally (35, p. 231), using the test-retest correlations of the degree aspiration variable over a one-year interval as a minimal estimate of the reliability of the most heavily weighted component in each composite score. These correlations were .65 and .68 for men and women, respectively. Similarly, these values were used as reliability estimates of other component predictors from the group of 11 biographical questions. Reliability estimates of the 1965 press scores were identical to those given in Appendix C (Table C-2). Since initial aspiration level had by far the largest weight in each linear combination, it is apparent that using the one-year test-retest correlation as the reliability estimate for this component, yielded an underestimate (or lower boundary value) for the estimated reliability of each composite score. Accordingly, estimates of the reliabilities of the composite scores were also derived assuming a reliability of .80 for each of the biographical components. The reliability estimates of the composite scores, using both bases for estimating reliabilities of biographical components, are shown in Table 27. It can be seen that each composite score based upon multiple predictors was more reliable than the single score representing initial aspiration level. It appears that the composite scores provided superior estimates of initial dispositions to seek advanced training, but that it made little difference whether one used the composite scores based on 7, 8, or 9 predictors or those based on 34 predictors.

TABLE 27

Estimates of Reliabilities of Weighted Composite Scores for Predicted Criteria

		Estimated reliability of composite			
		Using one-year test-retest reliability as reliability of each biographical component		Using .80 as reliability estimate of each biographical component	
Number of 1965 Predictors	1967 Criterion	Men	Women	Men	Women
1 (initial aspiration level)	Aspiration	.68	.65	.80	.80
7 or 9	Aspiration	.83	.76	.90	.86
34	Aspiration	.83	.79	.85	.88
1 (initial aspiration level)	Entry	.68	.65	.80	.80
8 or 9	Entry	.89	.87	.93	.93
34	Entry	.88	.82	.92	.88

Effects of different corrections for attenuation upon partial correlations. Bereiter (9) has expressed pessimism about the prospects of applying Lord's method of calculating partial correlations corrected for attenuation. He writes:

> One would like to be able to claim that this solves the over-correction-under-correction dilemma. Actually, the best that can be claimed is that it pushes it back one step. An overestimate of r_{XX} (the estimated reliability of the variable representing initial status) can make the correlation spuriously positive; an underestimate can make the correlation spuriously negative. The only conclusion is that the error is likely to be smaller in magnitude than that found in other correlation coefficients (9 , p. 9).

However, it seems likely that this conclusion is valid only when the reliabilities of the component variables are relatively low, and, particularly, when considering partial correlations that are near zero in magnitude. In the present case, we are dealing with measures of initial status that have relatively high reliabilities, and the sign of the partial correlations may be relatively independent of whether or not corrections for attenuation are applied, and, if applied, they may be relatively unaffected by whether lower-boundary or stepped-up reliability estimates are used. To be sure, one would expect the sign of partial correlation coefficients having a near zero magnitude to fluctuate according to the particular reliability estimate used, but such fluctuation is relatively unlikely for uncorrected partial correlation coefficients that depart markedly from zero. In other words, the partial correlation approach may be considerably more robust than the statements of Lord and Bereiter indicate.

To test this hypothesis partial correlations were calculated for women between each 1967 press score and each criterion score, holding constant the appropriate predicted criterion score based upon 1965 predictors. The data for women were used in these methodological comparisons since the weighted composite scores for women generally had slightly lower reliabilities (Table 27), and one would expect corrections for attenuation to have maximal effects upon these correlations. Table 28 summarizes the obtained partial correlations (a) when no corrections were made for attenuation, (b) when corrections for attenuation were made using the lower-boundary reliability estimates of measures of initial status discussed in the preceding section, and (c) when corrections for attenuation were made using the stepped-up reliability estimates of measures of initial status. For the latter two sets of correlations, corrections were also made for errors of measurement in assessing each criterion variable: for both the aspiration and the entry criterion scores the correlation between 1966 and 1967 degree aspirations (.67) was used as the reliability estimate. This procedure probably resulted in an underestimate of the reliability of each criterion score; if so there was a slight bias introduced which tended to maximize differences in the magnitudes of the partial correlation coefficients which were, and were not, corrected for attenuation.

TABLE 28

Partial Correlations between College Press Scores and Criterion Scores Using Different Corrections for Attenuation

	Entry Criterion[a]						Aspiration Criterion					
	Number of predictors on which composite score was based						Number of predictors on which composite score was based					
	8			34			7			34		
	Correction for attenuation			Correction for attenuation			Correction for attenuation			Correction for attenuation		
Press Scale	None	Min.	Mod.	None	Min.	Mod.	None	Min.	Mod.	None	Min.	Mod.
1	11**	13	14	16**	19	20	08	06	09	10*	10	12
2	15**	19	19	17**	21	22	01	-04	-02	04	01	03
3	07	11	10	07	14	12	-01	02	00	02	08	05
4	12**	12	14	13**	14	15	10*	08	11	10*	09	12
5	-13**	-15	-16	-12**	-12	-14	-07	-02	-06	-04	02	-02
6	17**	20	21	16**	17	19	15**	16	18	16**	20	22
7	07	07	08	09*	10	11	04	-02	02	04	00	03
8	14**	15	16	13**	13	15	07	01	06	08	05	09
9	06	06	07	07	07	08	05	01	04	06	05	07
10	12**	14	15	14**	18	18	12**	13	15	12**	14	16
11	09*	11	11	13**	17	17	02	00	02	06	08	08
12	13**	15	16	14**	16	17	03	-03	01	04	02	04
13	09*	09	11	09*	07	09	10*	06	10	09*	06	10

TABLE 28--Continued

	Entry						Aspiration					
	8			34			7			34		
Scale	None	Min.	Mod.	None	Min.	Mod.	None	Min.	Mod.	None	Min.	Mod.
14	05	07	07	03	02	03	01	01	02	01	01	01
15	-05	-03	-05	-08	-06	-08	-03	06	01	-03	05	00
16	00	-02	-01	01	-03	-01	00	-09	-05	01	-06	-02
17	-05	-06	-06	-03	-02	-03	01	07	05	02	10	07
18	11**	12	13	12**	11	13	07	-01	05	08	04	08
19	04	03	04	02	00	01	-01	-08	-05	-01	-08	-05
20	-02	00	-01	-04	-03	-04	-03	01	-02	-04	-03	-05
21	03	01	03	05	03	04	04	-04	01	04	-02	02
22	-02	-02	-02	-03	-04	-04	-07	-07	-08	-04	-03	-04
23	-02	-01	-02	01	03	02	04	-03	-04	-02	02	00

[a] Data based upon responses of 523 women. Decimals have been omitted, and only significance levels are shown for coefficients uncorrected for attenuation. Coefficients listed under "none" columns are correlations uncorrected for attenuation; those listed under "Min." columns are correlations corrected for attenuation using the minimal or lower-boundary estimates of reliability of the composites; those listed under "Mod." columns are correlations corrected for attenuation using the stepped-up estimates of reliability discussed in the text.

*$p < .05$
**$p < .01$

The results in Table 28 indicate that the discrepancies between the partial correlation coefficients based upon different corrections for attenuation, or upon none at all, were negligible. It can be seen that when the uncorrected coefficient was statistically significant, the coefficients corrected for attenuation confirmed *without exception* the sign of the uncorrected coefficient; moreover, the procedure of using corrections based upon lower-boundary or stepped-up reliability estimates had no effect upon the signs of these coefficients. It is obvious that the signs of the partial correlation coefficients did not exhibit the delicate dependence upon the particular reliability estimate of r_{XX} that Bereiter predicted. Since the coefficients uncorrected for attenuation appear to yield conservative estimates of the relationships, no corrections were applied to partial correlations in the following analyses. Also, it is apparent from Table 28 that there were only negligible differences associated with the use of linear combinations based upon 7 or 8 predictors or upon 34 predictors, and only correlations based upon all 34 predictors are reported below.

Test of effects of college press. Table 29 summarizes the results of tests of the effects of faculty and student press upon changes in dispositions to seek advanced training. The senior-year scores of both men and women on four of the faculty rapport scales--Adequacy as Positive Role Models, Press for Independent Thinking, Enthusiasm for Intellectual Values, and Evaluations of Ability--tended to be related to changes in dispositions, as assessed by both criterion measures. In contrast, the junior-year scores of these students on the same scales were generally unrelated to changes in dispositions. The results obtained for women were clearly the more striking in this respect: on 8 of the 9 faculty rapport scales at the end of the senior year the scores of women were significantly related to changes in entry dispositions, but only the press assessed by one of these same 9 scales at the end of the junior year was significantly related to changes in entry dispositions. It is, of course, entirely reasonable that decisions to pursue graduate study are more highly related to the perceived qualities of teachers known in the senior year, since seniors are presumably more occupied with making plans for what they will do after graduation from college, and should be more susceptible to influences relevant to these plans. In any case, it is apparent from Table 29 that the senior year scores of women on the faculty rapport scales were more consistently related to changes in criterion scores than were the scores of men. This sex difference is congruent with differences in responses to the question, asked on the last survey, "When did you make your plans to seek, or not to seek, graduate study?" It was found that 70 per cent of the women, as compared with only 54 per cent of the men, indicated they had made their plans during the third or fourth year in college.

It will be recalled that in the previous chapter, changes in the faculty rapport enjoyed by women during the junior year were hypothesized as partial causes of changes in the aspirations of these students, particularly the changes shown during the junior year. In contrast, the results in Table 29 indicate that the faculty rapport enjoyed by women

TABLE 29

Partial Correlations between College Press Scores and Criterion Scores for Men and Women

Press Scale	Factor	Entry Criterion[a]				Aspiration Criterion			
		1966 Press Scores		1967 Press Scores		1966 Press Scores		1967 Press Scores	
		Men	Women	Men	Women	Men	Women	Men	Women
2-Supportiveness	A	05	02	07	17**	-04	-04	02	04
12-Affiliation		05	02	08*	14**	00	-01	05	04
10-Adequacy as pos. role model		07	02	08*	14**	06	03	10**	12**
11-Excellence of teaching		07	04	06	13**	02	00	05	06
4-Independent thinking		03	05	10*	13**	-04	03	04	10*
1-Enthusiasm for intell. values		04	05	04	16**	04	01	12**	09*
6-Evals. of ability		06	09*	10*	16**	02	05	09*	16**
8-Advanced trng.		03	04	00	13**	02	-02	02	08
20-Opp. to fac. infl.		-02	-06	-06	-04	-04	00	-08*	-04
5-Compliance	B	-07	-06	-03	-13**	01	-01	04	-04
7-Humanities	C	01	04	03	09*	01	02	06	04
9-Science	D	04	01	00	07	11**	00	03	06
3-Faculty vocationalism	E	04	02	00	07	-01	-01	00	02
15-Student vocationalism		-01	-09*	-03	-08	-02	-03	-02	-03
13-Estheticism	F	-02	01	03	09*	03	-01	01	09*
16-Reflectiveness		-04	03	-01	01	-05	-02	-03	01
21-Intellectualism		01	10*	06	05	01	01	03	04
19-Science	G	06	03	06	02	05	-02	03	-01
18-Advanced trng.		10*	09*	12**	12**	09*	03	10**	08
17-Unfav. self-evals.	H	-04	04	-02	-03	-02	-04	00	02

TABLE 29--Continued

Scale	Factor	Entry				Aspiration			
		1966		1967		1966		1967	
		Men	Women	Men	Women	Men	Women	Men	Women
23-Playfulness	I	00	04	-02	01	-06	01	-05	-02
22-Affluence	J	02	01	-03	-03	-02	-04	-02	-04
14-Achievement	K	00	04	06	03	-01	-03	10*	01

[a] Decimals omitted. Partial correlations given are between given press score and criterion score at completion of college, holding constant the predicted criterion score based upon 34 predictors from 1965 survey. Scores were from 655 men and 523 women.

$^{*}p < .05$

$^{**}p < .01$

during the junior year generally was not related to changes in aspirations of women over the two-year interval. It is possible, however, that the absence of any relationship to 1966 press scores was due to the increased aspirations of women recorded in 1966 not being maintained by the very same women throughout the senior year. Nonetheless, it is clear that these results do not provide strong support for the interpretation advanced in Chapter IV of the junior-year changes in aspirations and the negatively accelerated growth curves in faculty rapport exhibited by women (Figure 4).

Student press for advanced training was also more or less consistently associated with changes in dispositions, with the associations for the senior year being slightly stronger than those for the junior year. We shall see in the next section that a similar picture emerges when we consider partial correlations for responses to single questionnaire items concerning related college experiences (cf. Table 30).

Effects of Other College Experiences upon Changes in Dispositions

In this section we shall consider partial correlations between dichotomous responses to single items and criterion scores, holding constant the appropriate predicted criterion scores as in the preceding section. The tables will make clear which attributes were weighted positively (scored 1) and which were weighted negatively (scored 0).

Talking with others about graduate school. On both the 1966 and 1967 surveys, panel members were asked whether they had discussed with others the possibility of entering a graduate or professional school. Table 30 shows that affirmative responses, particularly on the last survey, were significantly associated with increments in the disposition to go on for graduate study. Moreover, responses to the next question, "With whom did you discuss the possibility of seeking advanced training?", were also highly related to such increments. Thus, the reported acts of talking with one's academic advisor, with a faculty member other than one's advisor, with students at college, and with parents were more or less consistently related to increased dispositions to seek advanced training. In contrast, the act of talking a psychological or vocational counselor was reported by only about 8 per cent of the respondents and had weaker, and generally insignificant, associations with such changes in dispositions.

A related item of interest (not shown in Table 30) concerned the respondent's subjective estimate of how his desire to seek advanced training was affected as a result of such discussions with others. Of those panel members who indicated that they had talked with others about the possibility of graduate study, 60 per cent of both the men and the women reported that the discussions during the senior year had strengthened their desire. The corresponding percentages for estimates of the effects of discussions during the junior year were 76 per cent and 60 per cent for men and women, respectively.

TABLE 30

Partial Correlations between Criterion Scores and Talking with others about Graduate School

Survey question (and responses weighted most positively)	Entry Criterion[a]				Aspiration Criterion			
	1966 responses		1967 responses		1966 responses		1967 responses	
	Men	Woman	Men	Women	Men	Women	Men	Women
During the past year have you discussed with others the possibility of your entering a graduate or professional school for advanced training following graduation from college?								
Yes	05	08	09*	12**	07	16**	19**	28**
With whom did you discuss the possibility of seeking advanced training?								
Academic advisor in college	13**	19**	21**	23**	10*	09*	18**	14**
Faculty member other than advisor	03	11**	19**	19**	10*	09*	17**	27**
Students at my college	09*	11**	03	10*	07	12**	09*	27**
My parents	12**	14**	14**	20**	08*	14**	19**	24**
Psychological or vocat. counselor	04	01	06	06	11**	02	08	08
Of your close friends in college, how many are planning to go on for graduate or professional studies?								
All or almost all; more than half	09	06	10*	14**	07	09*	13**	15**

[a] See footnote a, Table 29.

*$p < .05$

**$p < .01$

On each of the later surveys, respondents were asked to think of the teacher who had the greatest influence on them during the past academic year, and to indicate whether this teacher had encouraged them to pursue a graduate or professional degree. At the end of the junior year, 54 per cent of the men and 49 per cent of the women reported receiving such encouragement, while at the end of the senior year 64 per cent of the men and 60 per cent of the women reported receiving such encouragement from the most influential teacher that year.

Academic achievements in college. When panel members were asked to list the awards and honors they had received during the past year, the most popular responses were "No special honors" and "Named on Dean's List." The former response was given by 48 per cent of the panel at the end of the junior year, and by 45 per cent at the end of the senior year; the percentages giving the latter response were 34 and 42 for the junior and senior years, respectively. It can be seen in Table 31 that the attribute of having won no special honors was generally negatively associated with increases in dispositions to seek advanced training, while being named to the Dean's List was generally positively associated with increments in the disposition assessed by the aspiration criterion. The achievement of having won, during the senior year, a scholarship based upon one's academic record was significantly correlated with increases in dispositions to seek advanced training among women, but not among men.

The partial correlations for reported grade-point averages, shown in Table 31, indicate that grades during the senior year were somewhat more highly related to increments in dispositions than were grades during the junior year. The correlations for scores on the related press scale, Faculty Evaluations of Ability, were similarly greater for senior-year scores than for junior-year scores (Table 29).

Participation in Honors Programs in college was neither very common nor very highly related to increments in desire to pursue graduate study. For the junior year 7 per cent, and for the senior year 8 per cent, of the panel members participated in such programs. With one exception, the partial correlations for participation in Honors Programs were insignificant.

Finally, we may note that undergraduate participation in research appeared to be related to change in desire to pursue graduate study. First, among men (but not among women) the report that one had been employed by a faculty member as a research assistant during the senior year was significantly related to increases in dispositions to seek advanced training. Second, the response that one had not had any experience in original research consistently had a negative correlation with such increases, although none of the individual partial correlation coefficients reached statistical significance.

TABLE 31

Partial Correlations between Criterion Scores and Academic Achievements in College

Survey question (and responses weighted most positively)	Entry Criterion[a]				Aspiration Criterion			
	1966 responses		1967 responses		1966 responses		1967 responses	
	Men	Women	Men	Women	Men	Women	Men	Women
Listed below are a number of awards and honors. Which of these have you received during the past year?								
Named on Dean's List	07	-01	14**	00	-01	09*	11**	11*
Elected to Phi Beta Kappa or other honor society	05	-02	03	05	01	01	04	10*
Won scholarship based on academic record	01	01	06	15**	-01	03	01	15**
No special honors	-12**	00	-18**	00	-01	-08	-13**	-13**
What was your grade-point average for undergraduate work completed during the past academic year? (Indicate closest letter grade equiv.)								
A (or high grades)	06	10*	17**	11*	04	13**	11**	11*
During the past year have you had any experience in original research?								
No	-04	-07	-01	-04	-03	-06	-01	-06
Yes, was employed by a faculty member as a research asst.	--	--	10*	00	--	--	11**	01
Have you participated in an Honors Program during the past year?								
Yes	00	-01	05	05	01	00	08*	05

[a] See footnote a, Table 29

*$p < .05$

**$p < .01$

Rival explanations of the results. The results concerning the effects of talking with others about graduate school illustrate the difficulty of arguing in any very dogmatic fashion about the direction of the cause-and-effect relationships that may underlie the partial correlations we have just considered. Most of these correlations can equally well be accounted for on the basis of a reversed cause-and-effect relationship: the decisions that students made to pursue or not to pursue graduate study may have stimulated them to talk to teachers about their new plans, thereby producing the observed associations. However, this example also illustrates the probable erroneousness of any attempt to claim that all of the causation was exlusively in one direction. Even among students who had more or less committed themselves to pursuing graduate study before talking with others, it is hard to imagine that the responses of others without exception had no effect. In truth, it seems likely that both causal directions were not only possible, but probable. In other words, it seems highly unlikely that either direction of causation can be ruled out: on the one hand, experiences in college undoubtedly affected dispositions to seek advanced training; and, on the other hand, decisions to pursue graduate study undoubtedly affected the kinds of experiences panel members had in college.

During the period of this study men who did not continue their education faced the prospect of being drafted for service in the Vietnam war, and it is possible that the draft made graduate study somewhat more attractive than it might otherwise have been. However, this external factor would be expected to reduce, rather than exaggerate, the associations we have considered. If a sizeable proportion of the male panel members were determined to pursue graduate study as a means of avoiding the draft, then their college experiences should have had relatively little effect upon whether they went on to graduate study. In short, a hypothetical tendency of college men to seek graduate study as a means of avoiding the draft was not a plausible rival explanation of the relationships found.

Conclusions

Numerous tests were made of hypotheses concerning the effects of college experiences upon dispositions to seek advanced training. The tests consisted of examining the statistical significance of partial correlation coefficients which held constant some 34 predictors indicative of initial dispositions to seek advanced training. The following hypotheses were confirmed: achieving good rapport with the faculty during the senior year of college increased desire to pursue graduate study; exposure to peers exerting press for advanced training increased such desire; talking with faculty members, students, and parents about plans for graduate study strengthened the desire to pursue graduate work; winning recognition for academic achievement in college strengthened dispositions for advanced training; and undergraduate research participation by men made them more disposed to pursue graduate work. While these tests in large part confirmed the research hypotheses, it was not possible to rule out an interpretation of the results in terms of a reversed cause-and-effect relationship.

It was concluded that the signs and magnitudes of the partial correlation coefficients were not highly dependent upon whether the coefficients were corrected for attenuation; similarly, the coefficients did not vary appreciably according to whether one used lower-boundary or stepped-up reliability estimates in making corrections for attenuation.

CHAPTER VI

CONCLUSIONS

The major objective of this study was to evaluate the effects of different college environments upon student attitudes toward advanced training. In this concluding statement we shall review the most salient findings, and discuss the extent to which it is possible to rule out rival explanations of the results. Rival explanations may be grouped into two broad classes--those seeking to account for alleged effects in terms of statistical artifacts, and those seeking to account for such effects in terms of competing theoretical concepts. We shall first consider the extent to which it was possible to rule out artifacts as explanations for the results.

Problems of Methodology

Recent discussions of the problems in measuring change express considerable pessimism that solutions to persisting interpretative dilemmas can be achieved. The results of this study suggest that the interpretative difficulties have been exaggerated, and that under certain conditions conventional statistical techniques provide appropriate tests of causal hypotheses concerning changes in the attributes of college students.

Estimates of the ecological effects of entering a major field of study appear to be the least equivocal of our results. It was possible to construe the longitudinal study as a quasi-experiment, and to control estimated true scores on the pretest by covariance analysis. Moreover, the use of marker variables for documenting certain highly predictable effects of entering scientific vs. humanistic curricula added to our confidence in the analysis. We have argued that it is not necessary to be able to claim that one has controlled every conceivable antecedent variable, or that one has ruled out every imaginable rival hypothesis. In the absence of random assignment of subjects to true experimental treatments such claims cannot be made. Rather, it is emphasized that the quasi-experiment provides one plausible interpretation for the results--treatments caused effects--and this interpretation is persuasive as long as no plausible rival interpretation can be discovered and documented. In the case of the ecological effects of entering a major field of study, the most obvious rival explanation in terms of biases introduced by errors of measurement in assessing initial status has been ruled out.

It was also possible to draw a limited number of conclusions concerning the effects of entering selected fields of study upon student value orientations. Even though estimates of true scores on initial value orientations were not available, it can be argued with confidence that these effects were non-spurious. A formulation of the conditions under which differences between pairs of treatment means, adjusted by conventional covariance analysis, are non-spurious was developed and corroborated.

Turning next to the analysis of the effects of college experiences upon decisions to enter graduate or professional school, it is believed that rival explanations of the partial correlations in terms of measurement errors arising from the use of fallible variables can be ruled out.

Overall, the results argue that quasi-experimental and observational data from longitudinal studies need not be hopelessly uninterpretable. On the contrary, we have demonstrated in a number of instances that conventional statistical techniques are more robust than has generally been supposed. In short, the results justify a considerably more optimistic outlook concerning the feasibility of untangling causal effects in panel studies than has been customary.

Theoretical Interpretations of the Results

Entry into a major field of study. We have seen that during the later college years there was an increasing differentiation between majors in the physical sciences and in the humanities in the characteristics attributed to the teachers and students known best by the respondents. These results were the most dramatic, but they were also fairly typical of the trends on press scales not highly related to the scientific vs. humanistic dichotomy. For example, the correlations between the overall F-ratios from the true-score covariance analyses and the increments in treatment-outcome correlations averaged about .85 (Table 21), indicating that significant field effects were accompanied by increasing differentiation between fields in perceived college environments. The most direct interpretation of this increasing differentiation in perceived college press is that it is the consequence of specializing in a major field of study. Are there rival interpretations of the phenomena? Donald T. Campbell (personal communication) has suggested a "fan-spread trajectory hypothesis," which postulates that people in different colleges (fields) might exhibit a similar divergence over time even if college (field) impacts had not intervened. Such a finding would, of course, invalidate the explanation that real differences between teachers and peers in different fields of study caused the divergence in perceived press. However, while the fan-spread trajectory hypothesis may have some plausibility for differential field changes in student values, it is a highly implausible hypothesis regarding the ecological changes we have described.

Newcomb and Feldman (33) suggest that processes similar to the increasing differentiation between fields observed in this study may be described in part as an accentuation or amplification of initial major-field differences. Thus these authors note that in other studies of changes by major field of study, average gains in student values for subgroups were moderately correlated with the average pretest scores of the subgroups. However, in the studies reviewed no attempt was made to take account of the fallible nature of the variables measured. In the present study, correlations were computed between the mean initial scale scores of each major field and its mean adjusted posttest score based upon the true-score analysis of covariance. Among men, these correlations ranged from .47 to .80 (with an average of .65) for the 5 scales showing significant field effects over the one-year interval, while they ranged from -.62 to .88 (with an average of .50) for the 9 scales showing significant field effects over the two-year interval (Table 17). Among women, the two correlations for one-year effects were .75 and .78, while the correlations ranged from -.13 to .79 (with an average of .62) for the 6 scales showing significant field effects over the two-year interval (Table 18). Moreover, the 3 scales showing negative correlations between mean initial scores and mean adjusted scores for fields were ones for which the F-ratios were generally of only borderline significance. Thus there is some validity to describing the differentiation process as an amplification of initial major-field differences. However, this characterization is in no way incompatible with the causal interpretation suggested in Chapter III. We can expect a modest degree of specialization in the major field even during the sophomore year of college, so that the initial ecological differences between students classified by their major fields should predict fairly well the ecological changes associated with further specialization in the major field. Newcomb and Feldman (33) similarly suggest that amplification of initial major-field differences may be interpreted in terms of differential reinforcement by academic-major experiences.

Overall changes in students and in college environments. In brief, as panel members progressed through college they exhibited striking increments in the rapport they enjoyed with faculty members, in the extent to which they planned to seek advanced graduate and professional degrees, and in their individualistic value orientations. One may interpret these changes as reflecting an increasing identification with teachers, and this interpretation is generally consistent with the results obtained using alternative modes of analysis.

A comparison of the fields effects with overall changes shown by panel members shows unmistakably that not all ecological changes can be adequately described as the accentuation of initial subgroup differences. Consider the fact that significant changes in average press score levels occurred on 7 of the 9 faculty rapport scales, while there were generally only small and insignificant field effects on these scales. A similar pattern was revealed on other press scales: overall decrements of great magnitude occurred with respect to faculty press for compliance and with respect to student press for unfavorable self-evaluations, though there was no evidence of field effects on these scales. The reverse kind of difference was also manifest: there were field effects of great magnitude with respect to faculty press for science and for humanities, but virtually no evidence of overall changes in average scores on these scales. The conclusion is inescapable that the analysis of changes in overall levels did in fact detect changes of a somewhat different order than those detected by the major field analyses. More importantly, we may conclude that the process of achieving identification with teachers was more or less common to all the fields of study considered.

Effects upon decisions to seek advanced training. We have seen that partial correlation tests generally confirmed the hypotheses that dispositions to enter graduate or professional school are strengthened by achieving good rapport with college teachers during the senior year, by exposure to peers exerting press for advanced training, by talking with others about plans to seek advanced training, by winning recognition for academic achievement, and, among men, by undergraduate research participation. A rival interpretation of these results is that types of college press, talks with others, academic achievements, and undergraduate research participation were effects, rather than causes, of changes in dispositions to seek advanced training. We have argued that the latter interpretation should be regarded as supplementary to--not competitive with--the causal interpretation we have proposed. For example, the college student who seeks out his advisor to discuss graduate study must have entertained the notion of such study before the conversation, and one may say that the tentative commitment was the cause of the talk. But it is equally likely that what the advisor says to the student may encourage or discourage him, and in this case one may say that the talk affected the commitment to pursue graduate study. Both of these causal interpretations seem to be of such high plausibility that one may question whether they should be regarded as real competitors. In any case, we were not able to rule out the alternative interpretation.

If it is true, as it appears to be, that men exhibited increases in identification with teachers fully as great as those shown by women (Table 25), then how can we account for the finding that the effects of achieving good rapport with teachers upon readiness to enter graduate school appeared to be much more consistent for women than for men (Table 29)? Perhaps there was a "ceiling effect" for men, for 82 per cent of the men, as compared with only 63 per cent of the women, said on the initial survey that they planned at least some graduate study. After two years, an additional 10 per cent of the men, but an additional 25 per cent of the women, reported such plans. Similarly, a much greater proportion of the women reported they made their plans to seek, or not to seek, graduate study during the third and fourth years of college. In other words, the process of identifying with teachers may have served primarily to maintain the initially high degree aspirations of men, while this process may have served mainly to elevate the aspirations of women.

Recommendations

The research suggests the following conclusions concerning methods of studying the impacts of college environments upon student attitudes. First, it is highly desirable to use quasi-experimental designs whenever possible. Second, a method of analysis which controls errors of measurement on the pretest is recommended. In most cases, the preferred method of analysis is the analysis of covariance using estimated true scores on the pretest as the covariate. Third, the inclusion of marker variables and prior formulation of the manner in which the varied treatments are expected to affect these variables is recommended.

Teachers and administrators interested in encouraging talented undergraduates to pursue advanced training should attempt to maximize the positive, and to minimize the negative, correlates of the adjusted criterion measures (Tables 29, 30, and 31). Clearly the process of achieving good rapport between faculty and students is one in which faculty members, as well as students, must participate. However, the results suggest that the rapport that counts is not primarily mediated by being friendly toward undergraduates, or even by presenting well-planned lectures. Rather it is more a matter of being a person students see as an appropriate model, of communicating one's evaluations of the student's ability, and of communicating enthusiasm for the intellectual life.

REFERENCES

1. Adcock, R. J. A problem in least squares. *The Analyst*, 1878, 5, 53-54.

2. Astin, A. W. A re-examination of college productivity. *Journal of Educational Psychology*, 1961, 52, 173-178.

3. Astin, A. W. "Productivity" of undergraduate institutions. *Science*, 1962, 136, 129-135.

4. Astin, A. W. Influences on the student's motivation to seek advanced training: Another look. *Journal of Educational Psychology*, 1962, 53, 303-309

5. Astin, A. W. Undergraduate institutions and the production of scientists. *Science*, 1963, 141, 334-338.

6. Astin, A. W. Differential college effects on the motivation of talented students to obtain the Ph.D. *Journal of Educational Psychology*, 1963, 54, 63-71.

7. Astin, A. W. Effect of different college environments on the vocational choices of high aptitude students. *Journal of Counseling Psychology*, 1965, 12, 28-34.

8. Astin, A. W. and Panos, R. J. A national research data bank for higher education. *Educational Record*, 1966, 47, 5-17.

9. Bereiter, C. Some persisting dilemmas in the measurement of change. In C. W. Harris (Ed.), *Problems in measuring change*. Madison, Wis.: University of Wisconsin Press, 1963. Pp. 3-20.

10. Bereiter, C. and Freedman, M. B. Fields of study and the people in them. In N. Sanford (Ed.), *The American College*. New York: Wiley, 1962. Pp. 563-596.

11. Campbell, D. T. From description to experimentation: Interpreting trends as quasi-experiments. In C. W. Harris (Ed.), *Problems in measuring change*. Madison, Wis.: University of Wisconsin Press, 1963. Pp. 212-242.

12. Campbell, D. T. and Clayton, K. N. Avoiding regression effects in panel studies of communication impact. *Studies in public communication*. University of Chicago Press, 1961, No. 3, 99-118; reprinted in Bobbs-Merrill, Reprint series in the social sciences, S-353.

13. Campbell, D. T. and Stanley, J. C. Experimental and quasi-experimental designs for research on teaching. In N. L. Gage (Ed.), *Handbook for research on teaching*. Chicago: Rand McNally, 1963. Pp. 171-246.

14. Cochran, W. G. Analysis of covariance: Its nature and uses. Biometrics, 1957, 13, No. 3, 261-281.

15. Cochran, W. G. and Cox, Gertrude M. Experimental designs. New York: Wiley, 1950.

16. DuBois, P. H. Multivariate correlational analysis. New York: Harper, 1957.

17. DuBois, P. H. and Manning, W. H. Methods of research in technical training. St. Louis: Washington University, Tech. Rep. No. 3, ONR No. Nonr 816(02), 1961.

18. Ferguson, G. A. A note on the Kuder-Richardson formula. Educational and Psychological Measurement, 1951, 11, 612-615.

19. Goldsen, Rose K., Rosenberg, M., Williams, R. M. Jr., and Suchman, E. A. What college students think. New York: Van Nostrand, 1960.

20. Guilford, J. P. Psychometric methods. New York: McGraw-Hill, 1954, 2nd Ed.

21. Gurin, Patricia and Katz, D. Motivation and aspiration in the Negro college. Office of Education, U. S. Department of Health, Education, and Welfare Project No. 5-0787. Ann Arbor, Mich.: Survey Research Center, Institute for Social Research, University of Michigan, 1966.

22. Hays, W. L. Statistics for psychologists. New York: Holt, Rinehart, and Winston, 1963.

23. Hendrickson, A. E. and White, P. O. Promax: A quick method for rotation to oblique simple structure. British Journal of Statistical Psychology, 1964, 17, 65-70

24. Isaacson, R. L., McKeachie, W. J., Milholland, J. E., Lin, Y. G., Hofeller, M., Baerwaldt, J. W., and Zinn, K. L. Dimensions of student evaluations of teaching. Journal of Educational Psychology, 1964, 55, 344-351.

25. Knapp, R. H. and Goodrich, H. B. Origins of American scientists. Chicago: University of Chicago Press, 1952.

26. Knapp, R. H. and Greenbaum, J. J. The younger American Scholar: His collegiate origins. Chicago: University of Chicago Press, 1953.

27. Kunkel, B. W. The representation of colleges in graduate and professional schools in the United States. Association of American Colleges Bulletin, 1941, 27, 449-474.

28. Kunkel, B. W. and Prentice, D. B. The colleges' contributions to intellectual leadership. *School and Society*, 1939, 50, 600-608.

29. Lord, F. M. Further problems in the measurement of growth. *Educational and Psychological Measurement*, 1958, 18, 437-451.

30. Lord, F. M. Large scale covariance analysis when the control variable is fallible. *Journal of the American Statistical* Association, 1960, 55, 307-321.

31. Lord, F. M. Elementary models for measuring change. In C. W. Harris (Ed.), *Problems in measuring change*. Madison, Wis.: University of Wisconsin Press, 1963, Pp. 21-38.

32. Lord, F. M. A paradox in the interpretation of group comparisons. *Psychological Bulletin*, 1967, 68, 304-305.

33. Newcomb, T. M. and Feldman, K. A. The impacts of colleges upon their students. A report to the Carnegie Foundation for the Advancement of Teaching. Ann Arbor, Michigan: University of Michigan, 1968.

34. Nichols, R. C. Personality change and the college. NMSC Research Reports, 1965, vol. I, No. 2, Evanston, Illinois: National Merit Scholarhip Corporation.

35. Nunnally, J. C. *Psychometric theory*. New York: McGraw-Hill, 1967.

36. Porter, A. C. *The effects of using fallible variables in the analysis of covariance*. (Doctoral dissertation, University of Wisconsin) Ann Arbor, Mich.: University Microfilms, 1967. No. 67-12,147.

37. Prentice, D. B. and Kunkel, B. W. The colleges' contribution to intellectual leadership. *School and Society*, 1930, 32, 594-600.

38. Prentice, D. B. and Kunkel, B. W. The colleges' contributions to intellectual leadership--II. *School and Society*, 1931, 33, 280-282.

39. Richards, J. M., Jr. A simple analytic model for college effects. *School Review*, 1966, 74, 380-392.

40. Rozelle, R. M. and Campbell, D. T. More plausible rival hypotheses in the cross-lagged panel correlation technique. Unpublished ms.

41. Skager, R., Holland, J. L., and Barskamp, L. A. Changes in self-ratings and life goals among students at colleges with different characteristics. ACT Research Reports, 1966, No. 14. Iowa City, Iowa: American College Testing Program.

42. Smith, H. F. Interpretation of adjusted treatment means and regression in analysis of covariance. *Biometrics*, 1957, 13, No. 3, 282-308.

43. Snow, C. P. *The two cultures: And a second look.* (Rev. ed.) Cambridge: Cambridge University Press, 1964.

44. Stanley, J. C. A common class of pseudo-experiments. *American Educational Research Journal*, 1966, 3, 79-87.

45. Thistlethwaite, D. L. College environments and the development of talent. *Science*, 1959, 130, 71-76.

46. Thistlethwaite, D. L. College press and student achievement. *Journal of Educational Psychology*, 1959, 50, 183-191.

47. Thistlethwaite, D. L. College press and changes in study plans of talented students. *Journal of Educational Psychology*, 1960, 51, 222-234.

48. Thistlethwaite, D. L. Fields of study and development of motivation to seek advanced training. *Journal of Educational Psychology*, 1962, 53, 53-64.

49. Thistlethwaite, D. L. Rival hypotheses for explaining the effects of different learning environments. *Journal of Educational Psychology*, 1962, 53, 310-315.

50. Thistlethwaite, D. L. Recruitment and the retention of talented college students. U. S. Department of Health, Education, and Welfare Cooperative Research Projects 657 and 657A. Nashville, Tenn.: Vanderbilt University, 1963.

51. Thistlethwaite, D. L. Diversities in college environments: Implications for student selection. In K. M. Wilson (Ed.), *Research related to college admissions*. Southern Regional Education Board, Atlanta, Georgia, 1963. Pp. 145-167.

52. Thistlethwaite, D. L. Effects of college upon student aspirations. U. S. Department of Health, Education, and Welfare Cooperative Research Project No. D-098. Nashville, Tenn.: Vanderbilt University, 1965.

53. Thistlethwaite, D. L. and Wheeler, N. Effects of teacher and peer subcultures upon student aspirations. *Journal of Educational Psychology*, 1966, 57, 35-47.

54. Traxler, A. E. An appraisal of American colleges on the basis of men graduates listed in *Who's Who in America*. Paper presented at the meeting of the American Association for the Advancement of Science, Indianapolis, December 29, 1957.

55. Visher, S. S. *Scientists starred 1903-1943 in "American men of science."* Baltimore: Johns Hopkins University Press, 1947.

56. Wallace, W. L. *Student culture: Social structure and continuity in a liberal arts college.* Chicago: Aldine, 1966.

57. Warnath, C. F. and Fordyce, H. R. Inventoried values of entering college freshmen. *Personnel Guidance Journal*, 1961, 40, 277-281.

58. Winer, B. J. *Statistical principles in experimental design.* New York: McGraw-Hill, 1962.

APPENDIX A

TABLE A-1

Colleges and Universities Attended by Respondents to 1965 Survey

State	College or University	Number of panel members returning useable questionnaires to all surveys
Alabama	University of Alabama	10
Arizona	University of Arizona	14
California	California State College (Long Beach)	11
	Chico State College	22
	San Jose State College	15
	Stanford University	30
	University of California at Riverside	30
	University of San Francisco	32
	University of the Pacific	22
Colorado	University of Denver	25
Connecticut	University of Connecticut	27
Florida	Rollins College	30
Georgia	Emory University	32
Illinois	Bradley University	21
	Northern Illinois University	24
Indiana	Indiana State University	17
Iowa	University of Iowa	25
Kansas	Kansas State Teachers College	21
Louisiana	University of Southwestern Louisiana	12
Maryland	Loyola College	42
Massachusetts	Boston University	17
	Clark University	42
Michigan	Michigan State University	21
	Northern Michigan University	12
	Western Michigan University	19
	University of Michigan	21

TABLE A-1--Continued

State	College or University	Number of panel members returning useable questionnaires to all surveys
Minnesota	Macalester College	38
Mississippi	University of Mississippi	13
Montana	University of Montana	17
Nebraska	University of Nebraska	18
New Jersey	Trenton State College	41
New York	Colgate University	36
	Hofstra University	16
	Manhattan College	32
	University of Rochester	45
North Carolina	Davidson College	36
Ohio	Bowling Green State University	23
	Ohio University	24
Oregon	Lewis and Clark College	33
	Oregon State University	19
	Reed College	24
Pennsylvania	Carnegie Institute of Technology	32
	University of Pennsylvania	17
Tennessee	University of Tennessee	21
Texas	Lamar State College of Technology	13
	North Texas State University	5
Utah	Utah State University	15
Virginia	University of Richmond	29
Washington	Washington State University	19
Wisconsin	University of Wisconsin	18
	Total	1,178

APPENDIX B

In this appendix copies of each of the three survey questionnaires are reproduced. The date of each survey was follows:

(1) August, 1965--Survey of Career Plans of College Students

(2) August, 1966--Survey of Career Plans of College Students: Survey No. 2.

(3) July, 1967--Survey of Career Plans of College Students: Survey No. 3.

SURVEY OF CAREER PLANS OF COLLEGE STUDENTS

Conducted by Vanderbilt University under a Grant from the U. S. Office of Education

---

Name__________________________________ Identification Number______
(Last Name) (First Name) (Middle Initial)

Present Home Address*__________________________________
(Street Address) (City) (State)

*PLEASE MAKE SURE THE ADDRESS YOU GIVE IS ONE AT WHICH YOU CAN RECEIVE MAIL ONE YEAR FROM NOW.

1. Sex. (Circle the number which corresponds to your sex.)

Male	1	(7)
Female	2	

---

2. Do you plan to be enrolled in college this Fall? (Circle one.)

* Yes, I am continuing as a full-time student this Fall	0	(8)
* Yes, I am continuing, but as a part-time student this Fall	1	
No, I have withdrawn but plan to return later	2	
No, I have withdrawn and do not expect to return	3	

* If "YES": PLEASE ANSWER a AND b.

a. What class standing will you have this Fall? (Circle one.)

Sophomore	0	(9)
Junior	1	
Senior	2	

b. Will you be enrolled in the same college you attended in Fall, 1964? (Circle one.)

Yes	0	(10)
* No	1	

* If "NO": What college or university will you be attending?

____
(Name) (City) (State)

---

3. What are your educational plans for the future?

Circle the number corresponding to the highest level of education you expect to complete. If you do not plan to seek any more higher education, circle the number most closely corresponding to the highest level of education you have already completed.

I expect to complete three years of college	0	(11)
I expect to get a bachelor's degree	1	
I expect to do some graduate study but not enough for an advanced degree	2	
I expect to get a Master's degree	3	
I expect to obtain a first-professional degree (M.D., D.D.S., L.L.B., or B.D.)	4	

I expect to obtain a Ph.D. or other equivalent academic doctorate degree. 5

---

4. Which of the following best describes where you lived during the past year? (Circle one.)

With my parents (or relatives) 0 (12)
Off-campus room, apartment house 1
* Dormitory or other campus housing. 2
* Fraternity or Sorority 3

* IF "DORMITORY OR FRATERNITY/SORORITY": Was your residence arranged so that separate sections or lounges were available for the use of small groups of students? (Circle one.)

Yes 0 (13)
No 1

---

5. How many roommates did you have during the past year? (Circle one.)

None. 0 (14)
One 1
Two 2
Three or more 3

---

6. Were you a member of a social fraternity or sorority at your college? (Circle one.)

No 0 (15)
Yes. 1

---

7. Have you participated in an Honors Program (special series of courses for undergraduates of outstanding promise or achievement) in your college? (Circle one.)

No 0 (16)
* Yes. 1

* IF "YES": How many years have you participated in the Honors Program at your college? (Circle one.)

One year 0 (17)
Two years 1

---

8. Does your school have a student counseling center? (Circle one.)

No. 0 (18)
* Yes 1

* IF "YES": What type of counseling opportunities were available at your counseling center? (Circle any which apply.)

Vocational counseling (including opportunity to take vocational aptitude tests). 0 (19)

Counseling on personal problems. 1 (20)

Counseling on study habits (rapid reading courses, etc.) . . . 2 (21)

Don't know 3 (22)

---

9. Rate the frequency with which you have discussed your career plans with others during the past two years. (Circle one in each row.)

	Never discussed them with this group	Once	Twice	Three or more times	
Discussions with academic advisor	0	1	2	3	(23)
Discussions with faculty members other than my advisor	0	1	2	3	(24)
Discussions with students .	0	1	2	3	(25)
Discussions with parents. .	0	1	2	3	(26)
Discussions with a professional psychological or vocational counselor	0	1	2	3	(27)

---

10. What is the highest degree offered at your school in your major field of study? (Circle one.)

Bachelor's degree 0 (28)

* Master's degree 1

* First-professional degree (M.D., D.D.S., L.L.B., B.D.). . . . 2

* Ph. D. or other equivalent academic doctorate degree. 3

---

* IF YOUR SCHOOL ENROLLS CANDIDATES FOR GRADUATE OR PROFESSIONAL DEGREES IN YOUR MAJOR FIELD OF STUDY, PLEASE ANSWER a AND b:

a. Have you during the past year discussed advanced training with any candidates for graduate or professional degrees? (Circle one.)

No. 0 (29)

Yes, but seldom 1

Yes, rather frequently. 2

b. Are there any women pursuing graduate or professional degrees in your major field of study? (Circle one.)

Yes 0 (30

No 1

Don't know. 2

---

11. Did you and your best friend on campus simultaneously take any of the same courses last year? (Circle one.)

No.	0	(31)
Yes, one course	1	
Yes, two courses.	2	
Yes, three or more courses.	3	

12. How many of your close friends have made definite decisions about the career fields they plan to enter after college? (Circle one.)

All or almost all	0	(32)
More than half.	1	
Less than half.	2	
Few or none	3	
Don't know.	4	

13. Of your close friends in college, how many are planning to go on for graduate or professional studies? (Circle one.)

All or almost all	0	(33)
More than half.	1	
Less than half.	2	
Few or none	3	
Don't know.	4	

14. How many of your close friends in college have the same major field as you? (Circle one.)

All or almost all	0	(34)
More than half.	1	
Less than half.	2	
Few or none	3	

15. During your college studies this past year have you had any experience in original research (participation in collecting and analyzing raw data or conducting an experiment, not writing papers based on published sources or doing experiments from a laboratory manual)? (Circle any which apply.)

No, I have never participated in original research.	0	(35)
Yes, I have--		
participated in research as part of a course	1	(36)
been employed by a faculty member as a research assistant.	2	(37)
had an off-campus job (summer or during school year) working in research.	3	(38)
participated in a summer research training program sponsored by the government or private foundation. . . .	4	(39)
conducted a research project on my own (e.g.,independent study)	5	(40)
other (circle and specify:________________________) . . .	6	(41)

16. How many scholarships did you apply for at the time you were graduated from high school? (Circle the number of applications.)

0 1 2 3 4 5 6 7 8 or more (42)

17. What was your approximate rank in your high school graduating class? (Circle the appropriate rank.)

In upper 5 per cent of class	0	(43)
In upper 10 per cent of class	1	
In upper 25 per cent of class	2	
In upper half of class	3	
In lower half of class	4	
Don't know (no information on rank given)	5	

18. What is your overall (cumulative) grade point average for undergraduate work at your college?

IMPORTANT: If your school uses letter grades (A, B, C, etc.) please circle the code number which is closest to your letter grade average.
WARNING: The number which you circle probably does not correspond to the number equivalent at your school (e.g., at most schools "straight A" equals 4.0; here it equals "0").

If your school does not use a system of grades which can be converted to the usual letter grades, please circle the last category.

(Circle one.)

Letter Grade	Code Number	
A	0	(44)
A-	1	
B+	2	
B	3	
B-	4	
C+	5	
C	6	
C- or lower	7	
No equivalent	8	

19. Using the same code numbers shown in the preceding question, estimate the cumulative grade point average of your closest friend at college during the past year. (Circle one.)

0 1 2 3 4 5 6 7 8 (45)

20. In your opinion, do you have the ability to successfully pursue a graduate or professional degree? (Circle one.)

No	0	(46)
Probably no	1	
Probably yes	2	
Yes	3	

21. How many--

a. Older brothers or sisters do you have? (Circle one.)

0 1 2 3 4 or more (47)

b. Younger brothers or sisters do you have? (Circle one.)

0 1 2 3 4 or more (48)

---

22. Occupation of father or guardian. (Circle the one which best applies.)

Profession requiring an advanced degree (lawyer, doctor, professor, minister, dentist, etc.) 0 (49)

Profession not requiring an advanced degree (banker, engineer, etc.). 1

Owns or manages business. 2

Supervisory or middle management executive (bookkeeper, cashier, personnel officer, etc.) 3

Sales and Clerical (insurance, real estate, retail clerk, postal clerk, etc.). 4

Owns or manages farm. 5

Skilled tradesman (carpenter, electrician, machinist, etc.) 6

Factory worker (laborer, farm laborer, janitor, mine laborer) . . . 7

---

23. Estimate the approximate income of your parental family. Consider annual income from all sources before taxes. (Circle one.)

Less than $5,000 per year 0 (50)

$5,000 to $7,499 per year 1

$7,500 to $9,999 per year 2

$10,000 to $14,999 per year 3

$15,000 or more per year. 4

I have no idea. 5

---

24. Religion:

a. In which you were reared. (Circle one.)

Protestant (Circle and specify:________________________) 0 (51)

Roman Catholic 1

Jewish 2

Other (Circle and specify:____________________________) 3

None 4

b. Your present preference. (Circle one.) (52)

Protestant (Circle and specify:________________________) 0

Roman Catholic 1

Jewish 2

Other (Circle and specify:________________________) 3

None 4

25. Are you married or engaged to be married? (Circle one.)

No. 0 (53)

* Yes, engaged to be married. 1

** Yes, married. 2

---

* IF "ENGAGED": When do you plan to be married? (Circle one.)

Within a year. 0 (54)

Within two years 1

Other (Circle and specify:________________________) 2

** IF "MARRIED": What will your spouse most likely be doing next year? (Circle the one which best applies.)

Working full time. 0 (55)

Housewife, mother. 1

Going to school. 2

Military Service 3

26. While attending college last year how frequently (on the average) did you date? (Circle one.)

Never, or very rarely. 0 (56)

About once a month 1

About once every two or three weeks. 2

Once a week 3

Twice a week 4

Three times a week 5

Four or more times a week. 6

27. How much formal education did your parents have? (Check the highest level attained by each parent.)

	(57) Father	(58) Mother
Some grade school	0	0
Finished grade school	1	1
Some high school.	2	2
Finished high school.	3	3
Some College.	4	4

Pb A

Finished college (Bachelor's degree). .	5	5
Completed Master's degree	6	6
Completed Ph.D. or first-professional degree (M.D., L.L.B.,etc.)	7	7
Don't know.	8	8

---

28. Your racial background. (Circle one.)

White	1	(59)
Negro	2	
Oriental.	3	
Other (Circle and specify:________________________)	4	

---

29. Have you ever served in the Armed Forces? (Circle one.)

No	0	(60)
Yes.	1	

---

30. Which of the following do you consider important requirements for a satisfying job or career? (Circle one in each row.)

	Highly important	Important	Unimportant	
a. Provide me an opportunity to use my special abilities and aptitudes	1	2	3	(61)
b. Provide me with a chance to earn a good deal of money	1	2	3	(62)
c. Give me an opportunity to live and work in the world of ideas. . . .	1	2	3	(63)
d. Provide me an opportunity to work on the application of knowledge to practical affairs.	1	2	3	(64)
e. Provide me an opportunity to work on theoretical problems regardless of practical value	1	2	3	(65)
f. Permit me to be creative and original	1	2	3	(66)
g. Give me social status and prestige	1	2	3	(67)
h. Give me opportunities to work with people rather than with things. .	1	2	3	(68)
i. Enable me to look forward to a stable, secure future	1	2	3	(69)

j. Leave me relatively free of supervision by others.	1	2	3	(70)
k. Give me a chance to exercise leadership.	1	2	3	(71)
l. Provide me with adventure	1	2	3	(72)
m. Give me an opportunity to be helpful to others	1	2	3	(73)

Major Field of Study and Anticipated Career

LIST OF MAJOR FIELDS AND OCCUPATIONS

The following list of code numbers is to be used in answering Questions 31 through 34 below. Please read the instructions for these questions before using the list.

01 Agricultural and Related Fields
  02 Agricultural Sciences (including Animal Husbandry, Agronomy, Farm Management, Horticulture, Soil Science, Soil Conservation, etc.)
  03 Forestry, Fish and Wild Life Management
  04 Farming (Code as occupation only, not as field of study)

09 Biological Sciences
  10 Biology
  11 Biochemistry
  12 Botany and Related Plant Sciences (Plant Pathology, Plant Physiology, etc.)
  13 Biophysics
  14 Physiology
  15 Zoology
  16 Other Biological Science Fields

Education (code as occupation only)
  17 Elementary School Teacher (including Kindergarten and Nursery School)
  18 Secondary School Teacher

Engineering
  19 Aeronautical
  20 Civil (including Agricultural, Architectural, Civil, Sanitary)
  21 Chemical (including Ceramic)
  22 Electrical
  23 Mechanical
  24 Metallurgical
  25 Mining
  26 Engineering, General and other specialties

05 Business and Administration
  06 Accounting
  07 Military Service, Military Science
  08 All other business and commercial fields (Business Administration, Marketing, Insurance, Finance, Industrial Relations, etc.)

Physical Science (NOTE: Secondary School Science Teaching is classified under Education)
  41 Astronomy, Astrophysics
  42 Chemistry (excluding Biochemistry which is 11)
  43 Physics (excluding Biophysics which is 13)
  44 Geography
  45 Geology, Geophysics
  46 Physical Science, General and other specialties

47 Psychology
  48 Clinical Psychology (code as graduate field or occupation only)
  49 Other psychology specialties (code as graduate field or occupation only)

Social Sciences
  50 Anthropology, Archeology
  51 Economics
  52 History
  53 Political Science, Government, International Relations
  54 Sociology
  55 Social Science, General and Other

Health Professions

27 Dentistry
28 Medicine
29 Nursing
30 Pharmacy
31 Veterinary Medicine
32 Medical Technology or Dental Hygiene
33 Other Health Fields or occupations

Humanities

34 Fine and Applied Arts (Art, Music, Speech, Drama, etc.)
35 English, Creative Writing
36 Classical Languages and Literatures
37 Modern Foreign Languages and Literatures
38 Philosophy

39 Law (Code as professional field or occupation only)

40 Mathematics and Statistics (NOTE: Secondary School Mathematics Teaching is classified under Education)

Other Fields and Occupations

56 Architecture, City Planning
57 Foreign Service, (Code as occupation only not field of study)
58 Home Economics (Code either as a field of study or as an occupation if you mean working as a home economist for pay)
59 Housewife (Code as occupation only, not as field of study)
60 Journalism, Radio-Television, Communications
61 Library Science, Archival Science
62 Social Work, Group Work
63 Theology, Religion (Employment as a Clergyman or religious worker)

70 Field of Study or Job Which has no Near Equivalent in This List (If you use this code, please describe your field or career in a word or two under the questions where it applied.)

INSTRUCTIONS: The preceding two-digit codes can be used to describe a field of study or a type of job. Thus, for example, in answering Question 31 below about fields of study, select the code number corresponding to your undergraduate major field of study; in answering Question 34, which asks about your anticipated career field, select the code number corresponding to the occupation you expect to enter.

When you have chosen the major field or occupation from the list which is your answer to one of the questions below, please write the two numbers of that field or occupation in the double box at the end of that question. For example, if "Psychology" is your major field of study, write its code number (47) in the boxes at the end of question 31 thus:

4	7

IMPORTANT NOTE: Certain code numbers should be used only for coding occupations, not for coding major field of study. Students who plan careers as Elementary Teachers or Secondary School Teachers should use "Education" codes only to describe their anticipated careers; they should code their major fields of study according to the academic field in which they are majoring. Students who plan careers as college or university teachers should code both their major field of study and their anticipated careers according to the appropriate academic field codes.

---

31. What will be your major field of study during the next two years in college?

If you will have a joint major, write in the boxes the code number of the one in which you will have the most course credits. ☐☐ (74-75)

---

32. Major field of study of your closest friend in college? ☐☐ (76-77)

---

33. Future graduate or professional major?

If you do not plan to ever go to graduate or professional school, write "00" in the boxes.

If you plan study in several fields, give the main one. ☐☐ (78-79)

---

34. Anticipated career field?

Please give what you expect to be your long-run career and ignore any school, stop-gap, or temporary military service which might precede it. ☐☐ (7-8)

Descriptions of Your Undergraduate Environment

NOTE: The purpose of this section is to obtain information about your undergraduate environment during the past school year. You are asked to be a reporter about those parts of your college you have known best. You have lived in a particular college environment, participated in its activities, seen its features, and sensed its expectations and demands. What kind of place was it?

Remember, your responses will be kept confidential; no person, except those working on this research project, will ever see your responses. Your responses will not be used to evaluate your teachers, your fellow students, or your college. They will be used only to study the effects of different environments upon career plans. There are no "right" or "wrong" answers; so please answer the questions honestly and try to estimate the degree to which the statements below characterized your college environment last year.

INSTRUCTIONS FOR PART A: Statements in PART A are about faculty members with whom you have had most of your courses or have known best during the past year--their courses and teaching methods, their values and emphases, and their formal and informal interactions with you. The ratings you make here may or may not correspond to the ratings you would make of faculty members in other parts of the college or university. We do not want you to describe all faculty members in your school. Think only of the teachers with whom you have had most of your courses or known best during the past year. We want you to describe their behavior and the effects of their behavior upon you.

DIRECTIONS: Please rate your teachers according to the degree to which each of the following statements describes their behavior, or the effects of their behavior upon you. The numbers in the rating scale should be interpreted as follows:

1 -- Strongly disagree; highly uncharacteristic and almost always false as a description of them.

2 -- Mostly disagree; mostly false as a description of them.

3 -- Neither agree nor disagree; true about as often as it was false as a description of them.

4 -- Mostly agree; mostly true as a description of them.

5 -- Strongly agree; highly characteristic and almost always true as a description of them.

CIRCLE THE NUMBER WHICH CORRESPONDS TO YOUR RATING FOR EACH DESCRIPTION

How the rating scale is to be used can be illustrated with the following statement:

"The faculty participated with students in many out-of-class activities."

If you should "mostly agree" that this statement characterized your teachers last year, you would mark as follows:

	Disagree			Agree	
The faculty participated with students in many out-of-class activities.	1	2	3	[✓ 4]	5

98A

PLEASE ANSWER EVERY ITEM IN PART A

PART A -- DESCRIPTIONS OF FACULTY MEMBERS

	Disagree			Agree		
35. They seemed to have little genuine enthusiasm for the intellectual life.	1	2	3	4	5	(9)
36. They were sensitive to student complaints and grievances and frequently tried to remedy the situation.	1	2	3	4	5	(10)
37. They offered many really practical courses designed to prepare the student for his occupation.	1	2	3	4	5	(11)
38. They did little to help the student develop his imaginative and creative capacities.	1	2	3	4	5	(12)
39. They usually demanded strict compliance with all course requirements.	1	2	3	4	5	(13)
40. The grades they gave me suggested that I was not unusually qualified for graduate work in the field.	1	2	3	4	5	(14)
41. They showed no interest in tracing the sources of their specialized field of study to philosophical or humanistic movements in the history of ideas.	1	2	3	4	5	(15)
42. They encouraged students to do graduate work.	1	2	3	4	5	(16)
43. They often stressed the limited usefulness of the concepts and methods of science.	1	2	3	4	5	(17)
44. On the whole I am grateful to them for showing me a way of life worthy of imitation.	1	2	3	4	5	(18)
45. Their lectures clearly revealed they had put a great deal of energy and thought into doing a good job of teaching.	1	2	3	4	5	(19)
46. They were not unusually skillful in getting to know students as individuals.	1	2	3	4	5	(20)
47. They clearly conveyed to me a sense of what it means to become deeply involved in a discipline or subject.	1	2	3	4	5	(21)
48. Students having difficulty with their courses could not expect to get special tutoring or counsel from them.	1	2	3	4	5	(22)
49. They rarely tried to give the student the practical training he will need in his career field.	1	2	3	4	5	(23)
50. They felt free to go into absolutely anything in trying to get students to develop their individual interests.	1	2	3	4	5	(24)
51. They sometimes waived requirements for admission to their courses.	1	2	3	4	5	(25)
52. Their evaluations of my academic performance convinced me that I had a flair for course work in this area.	1	2	3	4	5	(26)

98B

PART A -- DESCRIPTIONS OF FACULTY MEMBERS

	Disagree			Agree		
53. They frequently encouraged students to take courses in the humanities.	1	2	3	4	5	(27)
54. They spent little or no time counseling students about opportunities for graduate study in their field.	1	2	3	4	5	(28)
55. They stressed the value of the objective methods of science in finding answers to empirical questions.	1	2	3	4	5	(29)
56. By and large they were not the kind of person I'd like to be.	1	2	3	4	5	(30)
57. Their lectures were occasionally somewhat rambling and unorganized.	1	2	3	4	5	(31)
58. They really talked with the students, not just at them.	1	2	3	4	5	(32)
59. They were mostly content to follow their art or field of knowledge desultorily or superficially.	1	2	3	4	5	(33)
60. They expected the undergraduate to get by almost completely on his own resources.	1	2	3	4	5	(34)
61. Very few of their courses were aimed at preparing the student for his vocation.	1	2	3	4	5	(35)
62. They typically adjusted assignments and projects to fit the student's unique interests.	1	2	3	4	5	(36)
63. They were very reluctant to approve any exceptions in the curriculum requirements for graduation.	1	2	3	4	5	(37)
64. They provided personal evaluations of my ability which made me realize I had potentiality as a contributor in my field of study.	1	2	3	4	5	(38)
65. They seemed to have very little interest in drama or the arts.	1	2	3	4	5	(39)
66. They showed little interest in recruiting students into their field of study.	1	2	3	4	5	(40)
67. They sometimes criticized the trivial problems on which many scientists choose to work.	1	2	3	4	5	(41)
68. A few of them were the kind of person one can't help using as a model for oneself.	1	2	3	4	5	(42)
69. They were extremely efficient and skillful in their use of class time.	1	2	3	4	5	(43)
70. They took a personal interest in me and my work.	1	2	3	4	5	(44)
71. They typically exhibited great interest in, and enthusiasm about, their field of study.	1	2	3	4	5	(45)
72. Their counseling and guidance were really personal, patient, and extensive.	1	2	3	4	5	(46)

PART A -- DESCRIPTIONS OF FACULTY MEMBERS

	Disagree			Agree		
73. They frequently expressed the belief that the main purpose of college is to prepare the student for his vocation.	1	2	3	4	5	(47)
74. They provided the student little or no opportunity to pursue independent study under their supervision.	1	2	3	4	5	(48)
75. They often permitted students to deviate somewhat from published curriculum requirements in their course work.	1	2	3	4	5	(49)
76. They rarely gave the student enough feedback on his work to really know what his strong points were.	1	2	3	4	5	(50)
77. They tried to get students interested in the humanities.	1	2	3	4	5	(51)
78. They tried to persuade qualified students to seek advanced training in their field of study.	1	2	3	4	5	(52)
79. They encouraged student interest in understanding developments in modern science.	1	2	3	4	5	(53)
80. They did not make much of a difference in my life beyond the specific information they imparted.	1	2	3	4	5	(54)
81. They often seemed bored with their teaching assignments.	1	2	3	4	5	(55)
82. I never got to know any of them well enough to count them as good friends.	1	2	3	4	5	(56)
83. They did not appear to have any strong and active research interests in their field of study.	1	2	3	4	5	(57)
84. They tried to restrict appointments for planning study programs to one or two periods during the year.	1	2	3	4	5	(58)
85. Their courses tended to make students more practical and realistic.	1	2	3	4	5	(59)
86. They urged their students to undertake independent research projects.	1	2	3	4	5	(60)
87. They were relatively permissive when it comes to enforcing rules regarding course prerequisites.	1	2	3	4	5	(61)
88. They made little effort to give special recognition to students who did exceptional work.	1	2	3	4	5	(62)
89. Student interest in understanding and criticizing important works in art, music, and drama was encouraged by the faculty.	1	2	3	4	5	(63)
90. They taught their courses as if most of their students were going into graduate study.	1	2	3	4	5	(64)
91. It was obvious that they believed the American college has overemphasized education in the sciences.	1	2	3	4	5	(65)

PART A -- DESCRIPTIONS OF FACULTY MEMBERS

	Disagree			Agree		
92. Most of their opinions and values still seem somewhat alien and ivory-towered to me.	1	2	3	4	5	(66)
93. In their lectures the presentation of material was extremely well planned and illustrated.	1	2	3	4	5	(67)
94. They were typically warm and friendly in their relations with me.	1	2	3	4	5	(68)
95. It was obvious that they had fallen in love with the search for knowledge.	1	2	3	4	5	(69)
96. They often discussed the students' goals with them and tried to help them discover their special talents.	1	2	3	4	5	(70)
97. Very few of their courses here will be useful to students who go into business or industry.	1	2	3	4	5	(71)
98. They were too busy to hunt for ways of getting students to develop initiative.	1	2	3	4	5	(72)
99. They were inflexible in enforcing deadlines for course requirements.	1	2	3	4	5	(73)
100. They gave me extensive, evaluative comments on my term papers and examinations in their courses.	1	2	3	4	5	(74)
101. They had little appreciation for scholarship in the humanities.	1	2	3	4	5	(75)
102. They did not present much information about careers in their field of study.	1	2	3	4	5	(76)
103. They frequently encouraged students to take elective courses in the sciences.	1	2	3	4	5	(77)
104. I admired most of them as persons not just as professors.	1	2	3	4	5	(78)
105. Some of them were typically not adequately prepared to lecture on the day's topic.	1	2	3	4	5	(79)
106. They seemed to feel that teachers should maintain a certain amount of "emotional distance" from students.	1	2	3	4	5	(80)

PART B -- DESCRIPTIONS OF STUDENT ASSOCIATES

INSTRUCTIONS FOR PART B: Statements in PART B are about the undergraduate colleagues you know best. Your answers to this part should tell us what was generally characteristic of the undergraduate students you knew best, identified with, or associated with most commonly during the past year. The ratings you make for your personal associates in your undergraduate school may or may not correspond to the way you would rate undergraduate students in general or other groups of students at your college.

Describe only those students you knew best and associated with most commonly. They may, or may not, be students in your major field, living quarters or campus clubs.

107. Where did you meet the undergraduate colleagues you will be describing? (Circle the one which best applies.)

Dormitory or rooming house	1	(7)
My Fraternity or Sorority (or equivalent)	2	
Campus activities	3	
Class in my major field of study	4	
Other (Circle and specify:________________________)	5	

---

108. Does this group include both men and women? (Circle one.)

No, men only	1	(8)
Yes, but primarily men	2	
Yes, but primarily women	3	
No, women only	4	

DIRECTIONS: Follow the same rating directions shown for Part A.

PLEASE ANSWER EVERY ITEM IN PART B

	Disagree			Agree		
109. They had strong interests in poetry, music, painting, sculpture, architecture, etc.	1	2	3	4	5	(9)
110. Getting top grades was of little importance to most of my associates.	1	2	3	4	5	(10)
111. Few of them were eager to go out and start working in the practical world.	1	2	3	4	5	(11)
112. Books dealing with psychological problems or personal values were widely read and discussed by them.	1	2	3	4	5	(12)
113. On the whole they had greater difficulty competing for grades than I.	1	2	3	4	5	(13)
114. Most of my friends were planning to enter careers which required graduate or professional degrees.	1	2	3	4	5	(14)
115. They talked frequently about the philosophy and methods of science.	1	2	3	4	5	(15)
116. Most of them felt their teachers had helped them to achieve greater direction, force, and clarity.	1	2	3	4	5	(16)
117. We shared with each other the excitement of intellectual discoveries.	1	2	3	4	5	(17)
118. Many of them owned sports cars.	1	2	3	4	5	(18)
119. We rarely had much time for play or recreation.	1	2	3	4	5	(19)
120. They would regard a student who insisted on analyzing and classifying art and music as a little odd.	1	2	3	4	5	(20)

PART B -- DESCRIPTIONS OF STUDENT ASSOCIATES

	Disagree			Agree		
121. My friends were successful in getting mostly A's and B's in their courses last year.	1	2	3	4	5	(21)
122. They often complained that their college courses were not giving them the practical training they will need in their career fields.	1	2	3	4	5	(22)
123. They had very little interest in the analysis of value systems, and the relativity of societies and ethics.	1	2	3	4	5	(23)
124. My associates were more talented and better equipped to pursue their studies than I.	1	2	3	4	5	(24)
125. Few of them were seriously considering occupations which demand advanced graduate or professional training.	1	2	3	4	5	(25)
126. They would have very little interest in attending a lecture by a prominent scientist.	1	2	3	4	5	(26)
127. They were generally dissatisfied and disappointed with their teachers.	1	2	3	4	5	(27)
128. My friends had no strong intellectual commitments.	1	2	3	4	5	(28)
129. Most of them came from wealthy families.	1	2	3	4	5	(29)
130. Their parties were frequent and a lot of fun.	1	2	3	4	5	(30)
131. A lecture by an outstanding poet or dramatist would attract very few of them.	1	2	3	4	5	(31)
132. They were critical of students who were content just to get by with grades of C.	1	2	3	4	5	(32)
133. They often talked about the jobs that will be available to them after graduation from college.	1	2	3	4	5	(33)
134. They would have little interest in a lecture by a visiting philosopher or theologian.	1	2	3	4	5	(34)
135. Most of my associates had higher grade point averages than I.	1	2	3	4	5	(35)
136. None of them had much interest in doing research in their field of study.	1	2	3	4	5	(36)
137. They rarely took any more science courses than were required.	1	2	3	4	5	(37)
138. Most of my associates were grateful to the faculty for showing them a way of life worthy of imitation.	1	2	3	4	5	(38)
139. They tended to avoid students who liked to exercise their intellectual abilities.	1	2	3	4	5	(39)
140. Many of them had to work part-time to pay their college expenses.	1	2	3	4	5	(40)

/01/4

PART B -- DESCRIPTIONS OF STUDENT ASSOCIATES

	Disagree			Agree		
141. Our gathering places were typically active and noisy.	1	2	3	4	5	(41)
142. When they got together they often talk about trends in art, music or the theater.	1	2	3	4	5	(42)
143. They had little use for "grinds" who constantly studied hard to get top grades.	1	2	3	4	5	(43)
144. They tended to look down on students who insisted on evaluating courses in terms of how well they prepared one for a job.	1	2	3	4	5	(44)
145. They frequently debated social and political problems far into the night.	1	2	3	4	5	(45)
146. College was easier for me than for my friends.	1	2	3	4	5	(46)
147. Many of them had a strong desire to contribute to their field of study.	1	2	3	4	5	(47)
148. Most of my friends had strong interests in science and mathematics.	1	2	3	4	5	(48)
149. They were often caught up in the contagious enthusiasms of their teachers.	1	2	3	4	5	(49)
150. We often had long, serious intellectual discussions.	1	2	3	4	5	(50)
151. Few of them ever expected to become wealthy.	1	2	3	4	5	(51)
152. There weren't many opportunities for us to get together in extra-curricular activities.	1	2	3	4	5	(52)
153. They often went to concerts and art exhibits when they were available.	1	2	3	4	5	(53)
154. They attached little importance to how well they did relative to others in their courses.	1	2	3	4	5	(54)
155. They were more concerned about taking interesting courses than courses directly useful in their vocations.	1	2	3	4	5	(55)
156. Long, serious philosophical discussions were common among them.	1	2	3	4	5	(56)
157. In comparing their abilities with mine I never felt particularly handicapped.	1	2	3	4	5	(57)
158. They had little interest in pursuing careers involving research or scholarship.	1	2	3	4	5	(58)
159. Few, if any, of them would like to engage in scientific research.	1	2	3	4	5	(59)
160. They had strategies for helping each other to meet the faculty's requirements with less work.	1	2	3	4	5	(60)
161. They always enjoyed exploring ideas with each other.	1	2	3	4	5	(61)

PART B -- DESCRIPTIONS OF STUDENT ASSOCIATES

	Disagree			Agree		
162. They were accustomed to having plenty of money.	1	2	3	4	5	(62)
163. We seldom went to movies, parties, etc., on the spur of the moment.	1	2	3	4	5	(63)
164. They seemed to have little appreciation for the fine or applied arts.	1	2	3	4	5	(64)
165. Their grades indicated they were an unusually capable group relative to others in the college.	1	2	3	4	5	(65)
166. Most of them believed that the main goal of a college education is to prepare the student for his vocational career.	1	2	3	4	5	(66)
167. They never talked very much about ethical perplexities.	1	2	3	4	5	(67)
168. The extremely high calibre of my student colleagues put a lot of pressure on me.	1	2	3	4	5	(68)
169. I expect some of them to become eminent persons in their major fields of study.	1	2	3	4	5	(69)
170. Most of them were planning careers in science.	1	2	3	4	5	(70)
171. They sometimes ridiculed the faculty's mannerisms and ideas with wild caricatures.	1	2	3	4	5	(71)
172. They seemed to keep their intellectual concerns pretty much to themselves.	1	2	3	4	5	(72)
173. They tended to evaluate future jobs in terms of their intrinsic interest and had little concern about whether they offered one a chance to earn a great deal of money.	1	2	3	4	5	(73)
174. Everyone of us had a lot of fun in college.	1	2	3	4	5	(74)

MEN: SKIP PART C BELOW, AND ANSWER QUESTION 189 AT THE END OF THIS QUESTIONNAIRE.
WOMEN: PLEASE ANSWER ALL OF THE QUESTIONS IN PART C BELOW.

PART C -- ITEMS TO BE ANSWERED BY WOMEN ONLY

INSTRUCTIONS: Statements in PART C are about your own attitudes and opinions, and those of the undergraduate women you knew best during the past year, or about faculty members at your school. The object of description varies from item to item, but each statement is worded so that the frame of reference of the question should be clear.

DIRECTIONS: Please circle the number of the rating scale indicating the extent to which you believe the statement is true of the object of description (yourself, your women friends, or faculty members).

	Disagree			Agree		
175. Few, if any, of my close women friends planned to seek an advanced graduate or professional degree.	1	2	3	4	5	(7)

PART C -- ITEMS TO BE ANSWERED BY WOMEN ONLY

	Disagree			Agree		
176. If I were to decide to seek advanced training, I am confident that I would be able to get a desirable job in my career field.	1	2	3	4	5	(8)
177. It is easy for me to think of women who have made important contributions in my field of study.	1	2	3	4	5	(9)
178. Most of my close female friends felt they had to play down their intelligence when on dates.	1	2	3	4	5	(10)
179. Pursuing a career is more important to me than marriage.	1	2	3	4	5	(11)
180. Most of my close women friends felt they could not realize their full potentialities by "just being a housewife."	1	2	3	4	5	(12)
181. In my opinion it is unlikely that a woman can make an outstanding contribution in my major field of study.	1	2	3	4	5	(13)
182. Most of my female associates were determined to be themselves regardless of what their male companions expected.	1	2	3	4	5	(14)
183. My teachers tended to assume that women are unlikely to be interested in advanced training.	1	2	3	4	5	(15)
184. Most of my women friends believed that the goals of getting married and obtaining a graduate or professional degree are incompatible.	1	2	3	4	5	(16)
185. When dating men this year I never felt I had to play down my intelligence.	1	2	3	4	5	(17)
186. Most of my close women friends enjoyed engaging in intellectual discussions on dates.	1	2	3	4	5	(18)
187. I do not believe it will be possible for me to combine marriage and a career.	1	2	3	4	5	(19)
188. There were no women on the faculty of my school whom I admired.	1	2	3	4	5	(20)

IMPORTANT

You have now completed the questionnaire. Please fold it and return it in the enclosed, stamped envelope to Project E, Department of Psychology, Vanderbilt University, Nashville, Tennessee 37203. Your replies to this questionnaire are completely confidential, and absolutely no information of any kind about specific persons will be released to your school or anyone else. Your questionnaire will be read only by the research staff working on this project.

189. Do you wish to receive information about where you may find a report of the results of this project after the three-year study is completed? (Circle one.)

No . . . 0
Yes. . . 1

(75) or (21)

SURVEY OF CAREER PLANS OF COLLEGE STUDENTS

SURVEY NO. 2

Conducted by Vanderbilt University under a Grant from the U. S. Office of Education

---

Please check the name and address on the label in the above box. PLEASE MAKE SURE THE ADDRESS LISTED IS ONE AT WHICH YOU CAN RECEIVE MAIL ONE YEAR FROM NOW. If both are correct, skip to Item 1. If either should be corrected, please enter below the corrections to be made:

Name ____ (7)
(Last Name) (First Name) (Middle Initial)

Home Address ______________________________________
(Street Address) (City) (State)

1. Write below the name of the college or university you attended during the past 1965-66 academic year.

____
(Name) (City) (State)

2. Is this the same college you attended in Fall, 1964? (Circle one.)

Yes. 1 (8)
No 2

3. Do you plan to be enrolled in a college or university this Fall (1966)? (Circle one.)

*Yes, I am continuing as a full-time student this Fall 1 (9)
*Yes, I am continuing, but as a part-time student this Fall 2
No, I have withdrawn from college and will not be attending this Fall 3

*If "Yes": PLEASE ANSWER a AND b.

a. What class standing will you have this Fall? (Circle one.)

Junior 1 (10)
Senior 2
Graduate Student 3

b. Will you be enrolled in the same college you attended during the past 1965-66 academic year? (Circle one.)

Yes 1 (11)
*No 2

*If "No": What college or university will you be attending?

____
(Name) (City) (State)

103A

4. Which of the following best describes where you lived during the past year? (Circle one.)

With my parents (or relatives)	1	(12)
Off-campus room, apartment house	2	
Dormitory or other campus housing.	3	
Fraternity or sorority	4	
Other (Circle and specify:____________________)	5	

5. What are your educational plans for the future?

Circle the number corresponding to the highest level of education you expect to complete. If you do not plan to seek any more higher education, circle the number most closely corresponding to the highest level of education you have already completed.

I expect to complete three years of college.	1	(13)
I expect to get a bachelor's degree.	2	
I expect to do some graduate study but not enough for an advanced degree	3	
I expect to get a Master's degree	4	
I expect to obtain a first-professional degree (M.D., D.D.S., L.L.B., or B.D.).	5	
I expect to obtain a Ph.D. or other equivalent academic doctorate degree	6	

6. Using the same code numbers shown in the preceding question, indicate the future educational plans of your closest friend in college. (Circle one.)

1 2 3 4 5 6 (14)

7. Are you married? (Circle one.)

Yes	1	(15)
*No	2	

*If "No": PLEASE ANSWER a AND b.

a. While attending college last year how frequently (on the average) did you date?

Never or very rarely.	1	(16)
Once or twice a month	2	
Once or twice a week.	3	
Three or more times a week.	4	

b. Are you engaged to be married? (Circle one.)

No	1	(17)
Yes, plan to be married within a year	2	
Yes, plan to be married within two years.	3	
Yes, but not within two years. (Circle and describe your plans:____________________________ ______________________________). . . .	4	

103 B

8. Rate the frequency with which you have discussed your career plans with others during the past year. (Circle one in each row.)

	Never discussed them with this group	Once	Twice	Three or more times	
Discussions with academic advisor. .	4	5	6	7	(18)
Discussions with faculty members other than my advisor.	4	5	6	7	(19)
Discussions with students	4	5	6	7	(20)
Discussions with parents	4	5	6	7	(21)
Discussions with a professional psychological or vocational counselor.	4	5	6	7	(22)

9. Which of the following do you consider important requirements for a satisfying job or career? (Circle one in each row.)

	Highly important	Important	Unimportant	
a. Provide me with an opportunity to use my special abilities and aptitudes.	1	2	3	(23)
b. Provide me with a chance to earn a good deal of money.	1	2	3	(24)
c. Give me an opportunity to live and work in the world of ideas	1	2	3	(25)
d. Provide me an opportunity to work on the application of knowledge to practical affairs.	1	2	3	(26)
e. Provide me an opportunity to work on theoretical problems regardless of practical value.	1	2	3	(27)
f. Permit me to be creative and original. . . .	1	2	3	(28)
g. Give me social status and prestige	1	2	3	(29)
h. Give me opportunities to work with people rather than things	1	2	3	(30)
i. Enable me to look forward to a stable, secure future.	1	2	3	(31)
j. Leave me relatively free of supervision by others	1	2	3	(32)
k. Give me a chance to exercise leadership. . .	1	2	3	(33)

Item continued on following page

l. Provide me with adventure	1	2	3	(34)
m. Give me an opportunity to be helpful to others	1	2	3	(35)

10. What was your grade point average for undergraduate work completed during the past academic year (1965-66)?

IMPORTANT: If your school uses letter grades (A, B, C, etc.) please circle the code number which is closest to your letter grade average for the past year.

WARNING: The number you circle probably will not correspond to the number equivalent at your school (e.g., at most schools "straight A" equals 4.0; here it equals "1").

If your school does not use a system of grades which can be converted to the usual letter grades, please circle the last category.

Letter Grade	Code Number	
A	1	(36)
A-.	2	
B+.	3	
B	4	
B-.	5	
C+.	6	
C	7	
C- or lower	8	
No equivalent	9	

11. Using the same code numbers shown in the preceding question, estimate the grade point average of your closest friend at college during the past year. (Circle one.)

1 2 3 4 5 6 7 8 9 (37)

12. During the past year have you had any experience in original research (participation in collecting and analyzing data or conducting an experiment, not writing assigned term papers or doing experiments from a laboratory manual)? (Circle any which apply.)

No, I did not participate in original research last year 1 (38)

Yes, last year I --

was employed by a faculty member as a research assistant. . . 2 (39)

had an off-campus job doing research (during school year or summer). 3 (40)

participated in a summer research training program sponsored by the government or private foundation 4 (41)

conducted a research project on my own (e.g., independent study 5 (42)

Other (circle and specify:________________________________

________________________________) 6 (43)

13. Have you participated in an Honors Program (special series of courses for undergraduates of outstanding promise or achievement) during the past year? (Circle one.)

No. 1 (44)

Yes 2

14. Of your close friends in college, how many are planning to go on for graduate or professional studies? (Circle one.)

All or almost all	1	(45)
More than half	2	
Less than half	3	
Few or none	4	
Don't know	5	

---

15. During the past year have you discussed with others the possibility of your entering a graduate or professional school for advanced training following graduation from college? (Circle one.)

No	1	(46)
*Yes	2	

*If "Yes": PLEASE ANSWER a AND b.

a. With whom did you discuss the possibility of seeking advanced training? (Circle any which apply.)

Academic advisor at college	1	(47)
Faculty member other than my advisor	2	(48)
Students at my college	3	(49)
My parents	4	(50)
Psychological or vocational counselor	5	(51)
Other (circle and specify) ________________ ________________)	6	(52)

b. On the whole, how was your desire to seek advanced training affected as a result of these discussions? (Circle one.)

Desire was strengthened	1	(53)
Desire was weakened	2	
Desire was not affected one way or the other	3	

---

16. In your opinion do you have the ability to successfully pursue a graduate or professional degree? (Circle one.)

No	1	(54)
Probably no	2	
Probably yes	3	
Yes	4	

---

17. In which of the following have you been an active participant during the past year? (Circle as many as apply.)

Editorial staff of campus publication	1	(55)
Pre-professional student association (Engineering Assn., Pre-med Club, Psychology Club, etc.)	2	(56)
Student government organization	3	(57)
Campus group concerned with national or world issues	4	(58)
Campus group concerned with local issues	5	(59)

Item continued on following page

Inter-collegiate or intramural athletics.	6	(60)
Fraternity, sorority.	7	(61)
Other (Circle and specify:________________________). .	8	(62)

18. Listed below are a number of awards and honors. Which of these have you received during the past year? (Circle as many as apply.)

Named on Dean's list.	1	(63)
Elected to Phi Beta Kappa or other honor society based on academic achievement	2	(64)
Won scholarship based on academic record.	3	(65)
Won prize or award for literary, musical, or artistic work.	4	(66)
Won prize or award for scholarship or research work (e.g., "Smith prize for best biology experiment")	5	(67)
Other award or honor (Circle and specify:______________ ________________________).	6	(68)
No special honors	7	(69)

19. Think of the teacher who had the greatest influence on you during the past academic year, and please answer the following questions concerning him or his course(s):

(a) Briefly describe the qualities of this teacher or his course(s) that in your opinion made him have an unusually strong influence upon you:

____

____

____

____

(b) Did he influence you to change your plans about the career you will enter after college? (Circle one.)

No	1	(70)
Yes.	2	

(c) Did he encourage you to pursue a graduate or professional degree? (Circle one.)

No	1	(71)
Yes	2	

(d) Using the list of code numbers below for answering items 22 and 23, write in the boxes below the code number of the department or major field of this instructor:

☐☐ (72-73)

(e) Did you take a course under this teacher last year? (Circle one.)

No	1	(74)
*Yes	2	

Item continued on following page

If "Yes": PLEASE ANSWER (1) AND (2).

(1) Did you take a course from him in your major field of study? (Circle one.)

Yes	1	(75)
No.	2	

(2) How did you happen to take a course under him last year? (Circle one.)

Course was required	1	(76)
Took it on the advice of friends	2	
Had a previous course from him and wanted another. . . .	3	
Other (Circle and specify:____ __________________) . . .	4	

---

20. Have you changed your intended major field of study since last summer or fall when you responded to the first survey? (Circle one.)

No.	1	(77)
*Yes	2	

*IF "Yes": PLEASE **INDICATE** BELOW THE PRIMARY REASON YOU CHANGED **YOUR** PLANS:

____

____

____

____

---

21. Describe the type of employer for whom you expect to work in the career or occupation you now plan to enter. (Circle one.)

College or university	1	(78)
Primary or secondary school	2	
Industry (including small business or commercial organization)	3	
Government (including employment in military service) . . .	4	
Family-owned business or farm	5	
Plan to be self-employed.	6	
Other (Circle and specify:__________________________ ________________________)	7	

Major Field of Study and Anticipated Career

INTRUCTIONS: The two-digit codes below can be used to describe a field of study or a type of job. Thus, for example, in answering Question 22 below about fields of study, select the code number corresponding to your undergraduate major field of study; in answering Question 23, which asks about your anticipated career field, select the code number corresponding to the occupation you expect to enter.

7

When you have chosen the major field or occupation from the list which is your answer to one of the questions below, please write the two numbers of that field or occupation in the double box at the end of that question.

IMPORTANT NOTE: Certain code numbers should be used only for coding occupations, not for coding major field of study. Students who plan careers as Elementary Teachers or Secondary School Teachers should use "Education" codes only to describe their anticipated careers; they should code their major fields of study according to the academic field in which they are majoring. Students who plan careers as college or university teachers should code both their major field of study and their anticipated careers according to the appropriate academic field codes.

LIST OF MAJOR FIELDS AND OCCUPATIONS

01 Agricultural and Related Fields
- 02 Agricultural Sciences (including Animal Husbandry, Agronomy, Farm Management, Horticulture, Soil Science, Soil Conservation, etc.)
- 03 Forestry, Fish and Wild Life Management
- 04 Farming (Code as occupation only, not as field of study)

09 Biological Sciences
- 10 Biology
- 11 Biochemistry
- 13 Biophysics
- 14 Physiology
- 15 Zoology
- 16 Other Biological Science Fields

Education (code as occupation only)
- 17 Elementary School Teacher (including Kindergarten and Nursery School)
- 18 Secondary School Teacher

Engineering
- 20 Civil (including Agricultural, Architectural, Civil, Sanitary)
- 21 Chemical (including Ceramic)
- 22 Electrical
- 23 Mechanical
- 24 Metallurgical
- 25 Mining
- 26 Engineering, General and other specialties

Health Professions
- 27 Dentistry
- 28 Medicine
- 29 Nursing
- 30 Pharmacy
- 31 Veterinary Medicine
- 32 Medical Technology or Dental Hygiene
- 33 Other Health Fields or occupations

Humanities
- 34 Fine and Applied Arts (Art, Music, Speech, Drama, etc.)
- 35 English, Creative Writing
- 36 Classical Languages and Literatures
- 37 Modern Foreign Languages and Literatures
- 38 Philosophy

05 Business and Administration
- 06 Accounting
- 08 All other business and commercial fields (Business Administration, Marketing, Insurance, Finance, Industrial Relations, etc.)

Physical Science (NOTE: Secondary School Science Teaching is classified under Education)
- 42 Chemistry (excluding Biochemistry which is 11)
- 43 Physics (excluding Biophysics which is 13)
- 44 Geography
- 45 Geology, Geophysics
- 46 Physical Science, General and other specialties

47 Psychology
- 48 Clinical Psychology (code as graduate field or occupation only)
- 49 Other psychology specialties (code as graduate field or occupation only)

Social Sciences
- 50 Anthropology, Archeology
- 51 Economics
- 52 History
- 53 Political Science, Government, International Relations
- 54 Sociology
- 55 Social Science, General and Other

Other Fields and Occupations
- 56 Architecture, City Planning
- 57 Foreign Service (Code as occupation only not field of study)
- 58 Home Economics (Code either as a field of study or as an occupation if you mean working as a home economist for pay)
- 59 Housewife (Code as occupation only, not as field of study)
- 60 Journalism, Radio-Television, Communications
- 61 Library Science, Archival Science
- 62 Social Work, Group Work
- 63 Theology, Religion (Employment as a Clergyman or religious worker)

Item continued on following page

39 Law (Code as professional field or occupation only)

40 Mathematics and Statistics (NOTE: Secondary School Mathematics Teaching is classified under Education)

70 Field of Study or Job Which has no Near Equivalent in This List (If you use this code, please describe your field or career in a word or two under the questions where it applies.)

---

22. What will be your major field of study during the next year in college?

If you will have a joint major, write in the boxes the code number of the one in which you will have the most course credits. ☐☐ (79-80)

23. Anticipated career field?

Please give what you expect to be your long-run career and ignore any school, stop-gap, or temporary military service which might precede it. ☐☐ (7-8)

Descriptions of Your Undergraduate Environment

NOTE: The purpose of this section is to obtain information about your undergraduate environment during the past school year.

Although you answered a similar set of items last year, your college environment has undoubtedly changed in several respects since you last reported. We want to study permanence and change in college environments and to relate such changes to the development of student career plans. So please complete the following items even though many of them are similar to items in the survey you completed last year.

You are asked to be a reporter about those parts of your college you have known best. You have lived in a particular college environment, participated in its activities, seen its features, and sensed its expectations and demands. What kind of place was it?

Remember, your responses will be kept confidential; no person, except those working on this research project, will ever see your responses. Your responses will not be used to evaluate your teachers, your fellow students, or your college. They will be used only to study the effects of different environments upon career plans. There are no "right" or "wrong" answers; so please answer the questions honestly and try to estimate the degree to which the statements below characterized your college environment last year.

INSTRUCTIONS FOR PART A: Statements in PART A are about faculty members with whom you have had most of your courses or have known best during the past year--their courses and teaching methods, their values and emphases, and their formal and informal interactions with you. The ratings you make here may or may not correspond to the ratings you would make of faculty members in other parts of the college or university. We do not want you to describe all faculty members in your school. Think only of the teachers with whom you have had most of your courses or known best during the past year. We want you to describe their behavior and the effects of their behavior upon you.

DIRECTIONS: Please rate your teachers according to the degree to which each of the following statements describes their behavior, or the effects of their behavior upon you. The numbers in the rating scale should be interpreted as follows:

1 -- Strongly disagree; highly uncharacteristic and almost always false as a description of them.

2 -- Mostly disagree; mostly false as a description of them.

3 -- Neither agree nor disagree; true about as often as it was false as a description of them.

4 -- Mostly agree; mostly true as a description of them.

5 -- Strongly agree; highly characteristic and almost always true as a description of them.

Item continued on following page

CIRCLE THE NUMBER WHICH CORRESPONDS TO YOUR RATING FOR EACH DESCRIPTION

How the rating scale is to be used can be illustrated with the following statement:

"The faculty participated with students in many out-of-class activities."

If you should "mostly agree" that this statement characterized your teachers last year, you would mark as follows:

	Disagree			Agree	
The faculty participated with students in many out-of-class activities.	1	2	3	[✓ 4]	5

PART A -- DESCRIPTIONS OF FACULTY MEMBERS

PLEASE ANSWER EVERY ITEM IN PART A

	Disagree			Agree		
24. They seemed to have little genuine enthusiasm for the intellectual life.	1	2	3	4	5	(9)
25. They were sensitive to student complaints and grievances and frequently tried to remedy the situation.	1	2	3	4	5	(10)
26. They offered many really practical courses designed to prepare the student for his occupation.	1	2	3	4	5	(11)
27. They did little to help the student develop his imaginative and creative capacities.	1	2	3	4	5	(12)
28. They usually demanded strict compliance with all course requirements.	1	2	3	4	5	(13)
29. The grades they gave me suggested that I was not unusually qualified for graduate work in the field.	1	2	3	4	5	(14)
30. They showed no interest in tracing the sources of their specialized field of study to philosophical or humanistic movements in the history of ideas.	1	2	3	4	5	(15)
31. They encouraged students to do graduate work.	1	2	3	4	5	(16)
32. They often stressed the limited usefulness of the concepts and methods of science.	1	2	3	4	5	(17)
33. On the whole I am grateful to them for showing me a way of life worthy of imitation.	1	2	3	4	5	(18)
34. Their lectures clearly revealed they had put a great deal of energy and thought into doing a good job of teaching.	1	2	3	4	5	(19)
35. They were not unusually skillful in getting to know students as individuals.	1	2	3	4	5	(20)
36. They clearly conveyed to me a sense of what it means to become deeply involved in a discipline or subject.	1	2	3	4	5	(21)
37. Students having difficulty with their courses could not expect to get special tutoring or counsel from them.	1	2	3	4	5	(22)
38. They rarely tried to give the student the practical training he will need in his career field.	1	2	3	4	5	(23)
39. They felt free to go into absolutely anything in trying to get students to develop their individual interests.	1	2	3	4	5	(24)
40. They sometimes waived requirements for admission to their courses.	1	2	3	4	5	(25)
41. Their evaluations of my academic performance convinced me that I had a flair for course work in this area.	1	2	3	4	5	(26)
42. They frequently encouraged students to take courses in the humanities.	1	2	3	4	5	(27)
43. They spent little or no time counseling students about opportunities for graduate study in their field.	1	2	3	4	5	(28)

107 B

PART A -- DESCRIPTIONS OF FACULTY MEMBERS

	Disagree			Agree		
44. They stressed the value of the objective methods of science in finding answers to empirical questions.	1	2	3	4	5	(29)
45. By and large they were not the kind of person I'd like to be.	1	2	3	4	5	(30)
46. Their lectures were occasionally somewhat rambling and unorganized.	1	2	3	4	5	(31)
47. They really talked with the students, not just at them.	1	2	3	4	5	(32)
48. They were mostly content to follow their art or field of knowledge desultorily or superficially.	1	2	3	4	5	(33)
49. They expected the undergraduate to get by almost completely on his own resources.	1	2	3	4	5	(34)
50. Very few of their courses were aimed at preparing the student for his vocation.	1	2	3	4	5	(35)
51. They typically adjusted assignments and projects to fit the the student's unique interests.	1	2	3	4	5	(36)
52. They were very reluctant to approve any exceptions in the curriculum requirements for graduation.	1	2	3	4	5	(37)
53. They provided personal evaluations of my ability which made me realize I had potentiality as a contributor in my field of study.						
54. They seemed to have very little interest in drama or the arts.	1	2	3	4	5	(39)
55. They showed little interest in recruiting students into their field of study.	1	2	3	4	5	(40)
56. They sometimes criticized the trivial problems on which many scientists choose to work.	1	2	3	4	5	(41)
57. A few of them were the kind of person one can't help using as a model for oneself.	1	2	3	4	5	(42)
58. They were extremely efficient and skillful in their use of class time.	1	2	3	4	5	(43)
59. They took a personal interest in me and my work.	1	2	3	4	5	(44)
60. They typically exhibited great interest in, and enthusiasm about, their field of study.	1	2	3	4	5	(45)
61. Their counseling and guidance were really personal, patient, and extensive.	1	2	3	4	5	(46)
62. They frequently expressed the belief that the main purpose of college is to prepare the student for his vocation.	1	2	3	4	5	(47)
63. They provided the student little or no opportunity to pursue independent study under their supervision.	1	2	3	4	5	(48)
64. They often permitted students to deviate somewhat from published curriculum requirements in their course work.	1	2	3	4	5	(49)
65. They rarely gave the student enough feedback on his work to really know what his strong points were.	1	2	3	4	5	(50)
66. They tried to get students interested in the humanities.	1	2	3	4	5	(51)
67. They tried to persuade qualified students to seek advanced training in their field of study.	1	2	3	4	5	(52)
68. They encouraged student interest in understanding developments in modern science.	1	2	3	4	5	(53)

PART A -- DESCRIPTIONS OF FACULTY MEMBERS

		Disagree				Agree	
69.	They did not make much of a difference in my life beyond the specific information they imparted.	1	2	3	4	5	(54)
70.	They often seemed bored with their teaching assignments.	1	2	3	4	5	(55)
71.	I never got to know any of them well enough to count them as good friends.	1	2	3	4	5	(56)
72.	They did not appear to have any strong and active research interests in their field of study.	1	2	3	4	5	(57)
73.	They tried to restrict appointments for planning study programs to one or two periods during the year.	1	2	3	4	5	(58)
74.	Their courses tended to make students more practical and realistic.	1	2	3	4	5	(59)
75.	They urged their students to undertake independent research projects.	1	2	3	4	5	(60)
76.	They were relatively permissive when it comes to enforcing rules regarding course prerequisites.	1	2	3	4	5	(61)
77.	They made little effort to give special recognition to students who did exceptional work.	1	2	3	4	5	(62)
78.	Student interest in understanding and criticizing important works in art, music, and drama was encouraged by the faculty.	1	2	3	4	5	(63)
79.	They taught their courses as if most of their students were going into graduate study.	1	2	3	4	5	(64)
80.	It was obvious that they believed the American college has overemphasized education in the sciences.	1	2	3	4	5	(65)
81.	Most of their opinions and values still seem somewhat alien and ivory-towered to me.	1	2	3	4	5	(66)
82.	In their lectures the presentation of material was extremely well planned and illustrated.	1	2	3	4	5	(67)
83.	They were typically warm and friendly in their relations with me.	1	2	3	4	5	(68)
84.	It was obvious that they had fallen in love with the search for knowledge.	1	2	3	4	5	(69)
85.	They often discussed the students' goals with them and tried to help them discover their special talents.	1	2	3	4	5	(70)
86.	Very few of their courses here will be useful to students who go into business or industry.	1	2	3	4	5	(71)
87.	They were too busy to hunt for ways of getting students to develop initiative.	1	2	3	4	5	(72)
88.	They were inflexible in enforcing deadlines for course requirements.	1	2	3	4	5	(73)
89.	They gave me extensive, evaluative comments on my term papers and examinations in their courses.	1	2	3	4	5	(74)
90.	They had little appreciation for scholarship in the humanities.	1	2	3	4	5	(75)
91.	They did not present much information about careers in their field of study.	1	2	3	4	5	(76)

Item continued on following page

PART A -- DESCRIPTIONS OF FACULTY MEMBERS

	Disagree			Agree		
92. They frequently encouraged students to take elective courses in the sciences.	1	2	3	4	5	(77)
93. I admired most of them as persons not just as professors.	1	2	3	4	5	(78)
94. Some of them were typically not adequately prepared to lecture on the day's topic.	1	2	3	4	5	(79)
95. They seemed to feel that teachers should maintain a certain amount of "emotional distance" from students.	1	2	3	4	5	(80)

PART B -- DESCRIPTIONS OF STUDENT ASSOCIATES

INSTRUCTIONS FOR PART B: Statements in PART B are about the undergraduate colleagues you knew best during the past year. Your answers to this part should tell us what was generally characteristic of the undergraduate students you knew best, identified with, or associated with most commonly during the past year. The ratings you make for your personal associates in your undergraduate school may or may not correspond to the way you would rate undergraduate students in general or other groups of students at your college.

Describe only those students you knew best and associated with most commonly during the past year. They may, or may not, be students in your major field, living quarters or campus clubs.

96. Where did you meet the undergraduate colleagues you will be describing? (Circle the one which best applies.)

Dormitory or rooming house	1	(7)
My fraternity or sorority (or equivalent). . . .	2	
Campus activities.	3	
Class in my major field of study	4	
Other (Circle and specify:__________________)	5	

97. Does this group include both men and women? (Circle one.)

No, men only	1	(8)
Yes, but primarily men	2	
Yes, but primarily women	3	
No, women only	4	

DIRECTIONS: Follow the same rating directions shown for Part A.

PLEASE ANSWER EVERY ITEM IN PART B

	Disagree			Agree		
98. They had strong interests in poetry, music, painting, sculpture, architecture, etc.	1	2	3	4	5	(9)
99. Getting top grades was of little importance to most of my associates.	1	2	3	4	5	(10)
100. Few of them were eager to go out and start working in the practical world.	1	2	3	4	5	(11)
101. Books dealing with psychological problems or personal values were widely read and discussed by them.	1	2	3	4	5	(12)
102. On the whole they had greater difficulty competing for grades than I.	1	2	3	4	5	(13)

109 A

PART B -- DESCRIPTIONS OF STUDENT ASSOCIATES

		Disagree				Agree	
103.	Most of my friends were planning to enter careers which required graduate or professional degrees.	1	2	3	4	5	(14)
104.	They talked frequently about the philosophy and methods of science.	1	2	3	4	5	(15)
105.	Most of them felt their teachers had helped them to achieve greater direction, force, and clarity.	1	2	3	4	5	(16)
106.	We shared with each other the excitement of intellectual discoveries.	1	2	3	4	5	(17)
107.	Many of them owned sports cars.	1	2	3	4	5	(18)
108.	We rarely had much time for play or recreation.	1	2	3	4	5	(19)
109.	They would regard a student who insisted on analyzing and classifying art and music as a little odd.	1	2	3	4	5	(20)
110.	My friends were successful in getting mostly A's and B's in their courses last year.	1	2	3	4	5	(21)
111.	They often complained that their college courses were not giving them the practical training they will need in their career fields.	1	2	3	4	5	(22)
112.	They had very little interest in the analysis of value systems, and the relativity of societies and ethics.	1	2	3	4	5	(23)
113.	My associates were more talented and better equipped to pursue their studies than I.	1	2	3	4	5	(24)
114.	Few of them were seriously considering occupations which demand advanced graduate or professional training.	1	2	3	4	5	(25)
115.	They would have very little interest in attending a lecture by a prominent scientist.	1	2	3	4	5	(26)
116.	They were generally dissatisfied and disappointed with their teachers.	1	2	3	4	5	(27)
117.	My friends had no strong intellectual commitments.	1	2	3	4	5	(28)
118.	Most of them came from wealthy families.	1	2	3	4	5	(29)
119.	Their parties were frequent and a lot of fun.	1	2	3	4	5	(30)
120.	A lecture by an outstanding poet or dramatist would attract very few of them.	1	2	3	4	5	(31)
121.	They were critical of students who were content just to get by with grades of C.	1	2	3	4	5	(32)
122.	They often talked about the jobs that will be available to them after graduation from college.	1	2	3	4	5	(33)
123.	They would have little interest in a lecture by a visiting philosopher or theologian.	1	2	3	4	5	(34)
124.	Most of my associates had higher grade point averages than I.	1	2	3	4	5	(35)
125.	None of them had much interest in doing research in their field of study.	1	2	3	4	5	(36)
126.	They rarely took any more science courses than were required.	1	2	3	4	5	(37)
127.	Most of my associates were grateful to the faculty for showing them a way of life worthy of imitation.	1	2	3	4	5	(38)

PART B -- DESCRIPTIONS OF STUDENT ASSOCIATES

		Disagree			Agree		
128.	They tended to avoid students who liked to exercise their intellectual abilities.	1	2	3	4	5	(39)
129.	Many of them had to work part-time to pay their college expenses.	1	2	3	4	5	(40)
130.	Our gathering places were typically active and noisy.	1	2	3	4	5	(41)
131.	When they got together they often talked about trends in art, music or the theater.	1	2	3	4	5	(42)
132.	They had little use for "grinds" who constantly studied hard to get top grades.	1	2	3	4	5	(43)
133.	They tended to look down on students who insisted on evaluating courses in terms of how well they prepared one for a job.	1	2	3	4	5	(44)
134.	They frequently debated social and political problems far into the night.	1	2	3	4	5	(45)
135.	College was easier for me than for my friends.	1	2	3	4	5	(46)
136.	Many of them had a strong desire to contribute to their field of study.	1	2	3	4	5	(47)
137.	Most of my friends had strong interests in science and mathematics.	1	2	3	4	5	(48)
138.	They were often caught up in the contagious enthusiasms of their teachers.	1	2	3	4	5	(49)
139.	We often had long, serious intellectual discussions.	1	2	3	4	5	(50)
140.	Few of them ever expected to become wealthy.	1	2	3	4	5	(51)
141.	There weren't many opportunities for us to get together in extra-curricular activities.	1	2	3	4	5	(52)
142.	They often went to concerts and art exhibits when they were available.	1	2	3	4	5	(53)
143.	They attached little importance to how well they did relative to others in their courses.	1	2	3	4	5	(54)
144.	They were more concerned about taking interesting courses than courses directly useful in their vocations.	1	2	3	4	5	(55)
145.	Long, serious philosophical discussions were common among them.	1	2	3	4	5	(56)
146.	In comparing their abilities with mine I never felt particularly handicapped.	1	2	3	4	5	(57)
147.	They had little interest in pursuing careers involving research or scholarship.	1	2	3	4	5	(58)
148.	Few, if any, of them would like to engage in scientific research.	1	2	3	4	5	(59)
149.	They had strategies for helping each other to meet the faculty's requirements with less work.	1	2	3	4	5	(60)
150.	They always enjoyed exploring ideas with each other.	1	2	3	4	5	(61)
151.	They were accustomed to having plenty of money.	1	2	3	4	5	(62)
152.	We seldom went to movies, parties, etc., on the spur of the moment.	1	2	3	4	5	(63)

PART B -- DESCRIPTIONS OF STUDENT ASSOCIATES

		Disagree				Agree	
153.	They seemed to have little appreciation for the fine or applied arts.	1	2	3	4	5	(64)
154.	Their grades indicated they were an unusually capable group relative to others in the college.	1	2	3	4	5	(65)
155.	Most of them believed that the main goal of a college education is to prepare the student for his vocational career.	1	2	3	4	5	(66)
156.	They never talked very much about ethical perplexities.	1	2	3	4	5	(67)
157.	The extremely high calibre of my student colleagues put a lot of pressure on me.	1	2	3	4	5	(68)
158.	I expect some of them to become eminent persons in their major fields of study.	1	2	3	4	5	(69)
159.	Most of them were planning careers in science.	1	2	3	4	5	(70)
160.	They sometimes ridiculed the faculty's mannerisms and ideas with wild caricatures.	1	2	3	4	5	[illegible])
161.	They seemed to keep their intellectual concerns pretty much to themselves.	1	2	3	4	5	(72)
162.	They tended to evaluate future jobs in terms of their intrinsic interest and had little concern about whether they offered one a chance to earn a great deal of money.	1	2	3	4	5	(73)
163.	Everyone of us had a lot of fun in college.	1	2	3	4	5	(74)

IMPORTANT

You have now completed the questionnaire. Please fold it and return it in the enclosed stamped envelope to Project E, Department of Psychology, Vanderbilt University, Nashville, Tennessee 37203. Your replies to this questionnaire are completely confidential, and absolutely no information of any kind about specific persons will be released to your school or anyone else. Your questionnaire will be read only by the research staff working on this project.

110 B

SURVEY OF CAREER PLANS OF COLLEGE STUDENTS

SURVEY NO. 3

Conducted by Vanderbilt University under a Grant from the U. S. Office of Education

---

Please check the name and address on the label in the above box. PLEASE MAKE SURE THE ADDRESS LISTED IS ONE AT WHICH YOU CAN RECEIVE MAIL NEXT YEAR. If both are correct, skip to Item 1. If either should be corrected, please enter below the corrections to be made:

Name____
(Last Name) (First Name) (Middle Initial)

Home Address____
(Street Address) (City) (State)

1. What will you be doing this Fall?

Circle the number which describes what you will be doing this Fall (1967). If you expect to be doing two things simultaneously, circle both and in the blank space below indicate which will be your main activity. If you are considering two alternative plans, circle only the more probable.

Graduate study in arts and science or other academic field (physical science, engineering, biological science, social science, humanities, etc.). 1 (7)

Graduate study in a professional field (law, medicine, dental science, theology) 2

Working full time at a type of job which I expect to be my long run career field 3

Non-career military service 4

Working full time at a civilian job which will probably not be my long run career field. 5

Housewife 6

Undergraduate study in a program of study leading to a bachelor's degree. . . 7

Other (Circle and specify:______________________________) . . . 8

---

2. What are your educational plans for the future?

Circle the number corresponding to the highest level of education you expect to complete. If you do not plan to seek any more higher education, circle the number most closely corresponding to the highest level of education you have already completed.

I expect to complete three years of college. 1 (8)

I expect to get a bachelor's degree. 2

I expect to do some graduate study but not enough for an advanced degree. 3

I expect to get a Master's degree. 4

I expect to obtain a first-professional degree (M.D., D.D.S., L.L.B., or B.D.) 5

I expect to obtain a Ph. D. or other equivalent academic doctorate degree 6

///A

3. Have you at any time applied for admission to any graduate or professional school? (Circle one.)

No, and I do not expect to apply for admission to such a school next year (Fall, 1968)	1	(9)
No, but I do expect to apply for admission next year (academic year 1968-69)	2	
*Yes, I applied to one school	3	
*Yes, I applied to 2 or 3 schools	4	
*Yes, I applied to 4 or more schools	5	

*IF "YES": PLEASE ANSWER a AND b.

a. How many schools accepted you? (Circle one.)

None	0	(10)
One	1	
More than one	2	

b. How many schools rejected your application? (Circle one.)

None	0	(11)
One	1	
More than one	2	

4. Have you at any time applied for financial support (scholarship, fellowship, or assistantship) in order to attend a graduate or professional school? (Circle one.)

No	0	(12)
*Yes	1	

*IF "YES": PLEASE ANSWER a AND b.

a. How many applications for financial support did you make? (Circle one.)

One	1	(13)
2 or 3	2	
4 or more	3	

b. Which of the following do you expect to receive (or did you receive)? (Circle one or more.)

Stipend for part tuition	1	(14)
Stipend for full tuition	2	
Stipend for tuition plus an amount under $1,000	3	
Stipend for tuition plus $1,000 or more	4	
No financial support of any kind	5	
Don't know yet	6	

111B

5. When did you make your present plans to seek, or not to seek, graduate study?

During high school or before 1 (15)

First or second year in college. 2

Third or fourth year in college. 3

---

6. How many years of college undergraduate work have you completed? (Circle one)

1 2 3 4 5 (16)

---

7. Have you received a Bachelor of Arts or Bachelor of Science degree (or its equivalent)? (Circle one.)

Yes, received it in May or June, 1967. . . . . 1 (17)

Yes, received it before May or June, 1967. 2

No, but will have fulfilled all the requirements by September, 1967. . 3

*No, but expect to fulfill all requirements for it after September, 1967 4

*No, do not expect to receive a bachelor's degree but do expect to receive a first-professional degree. 5

No, do not expect to receive either a bachelor's degree or a first-professional degree. 6

*IF YOU CHECKED ONE OF THESE TWO CATEGORIES TO QUESTION 7, WHAT IS THE APPROXIMATE DATE YOU EXPECT TO RECEIVE YOUR DEGREE?

(Kind of degree) (Probable date)

---

8. Write below the name of the college or university you attended during the past 1966-67 academic year.

(Name) (City) (State)

---

9. Is this the same college you attended in Fall, 1965? (Circle one.)

Yes 1 (18)

No. 2

---

10. Listed below are a number of awards and honors. Which of these have you received during the past year? (Circle as many as apply.)

Named on Dean's list 1 (19)

Elected to Phi Beta Kappa or other honor society based on academic achievement 2 (20)

Won scholarship based on academic record 3 (21)

Won prize or award for literary, musical, or artistic work 4 (22)

Won prize or award for scholarship or research work (e.g., "Smith prize for best biology experiment"). 5 (23)

Other award or honor (Circle and specify: ______________________________). 6 (24)

No special honors. 7 (25)

11. In which of the following have you been an active participant during the past year? (Circle as many as apply.)

Editorial staff of campus publication	1	(26)
Pre-professional student association (Engineering Assn., Pre-med Club, Psychology Club, etc.)	2	(27)
Student government organization	3	(28)
Campus group concerned with national or world issues	4	(29)
Campus group concerned with local issues	5	(30)
Inter-collegiate or intramural athletics	6	(31)
Fraternity, sorority	7	(32)
Other (Circle and specify:________________________)	8	(33)

---

12. What was your grade point average for undergraduate work completed during the past academic year (1966-67)?

IMPORTANT: If your school uses letter grades (A, B, C, etc.) please circle the code number which is closest to your letter grade average for the past year.

WARNING: The number you circle probably will not correspond to the number equivalent at your school (e.g., at most schools "straight A" equals 4.0; here it equals "1").

If your school does not use a system of grades which can be converted to the usual letter grades, please circle the last category.

Letter Grade	Code Number	
A	1	(34)
A-	2	
B+	3	
B	4	
B-	5	
C+	6	
C	7	
C- or lower	8	
No equivalent	9	

---

13. During the past year have you had any experience in original research (participation in collecting and analyzing data or conducting an experiment, not writing assigned term papers or doing experiments from a laboratory manual)? (Circle any which apply.)

No, I did not participate in original research last year	1	(35)
Yes, last year I --		
was employed by a faculty member as a research assistant	2	(36)
had an off-campus job doing research (during school year or summer)	3	(37)
participated in a summer research training program sponsored by the government or private foundation	4	(38)
conducted a research project on my own (e.g., independent study)	5	(39)
Other (circle and specify:________________________ ________________________)	6	(40)

14. Have you participated in an Honors Program (special series of courses for undergraduates of outstanding promise or achievement) during the past year? (Circle one.)

No	1	(41)
Yes	2	

---

15. During the past year have you discussed with others the possibility of your entering a graduate or professional school for advanced training following graduation from college? (Circle one.)

No	1	(42)
*Yes	2	

---

*If "Yes": PLEASE ANSWER a AND b.

a. With whom did you discuss the possibility of seeking advanced training? (Circle any which apply.)

Academic advisor at college	1	(43)
Faculty member other than my advisor	2	(44)
Students at my college	3	(45)
My parents	4	(46)
Psychological or vocational counselor	5	(47)
Other (circle and specify: ____)	6	(48)

---

b. On the whole, how was your desire to seek advanced training affected as a result of these discussions? (Circle one.)

Desire was strengthened	1	(49)
Desire was weakened	2	
Desire was not affected one way or the other	3	

---

16. In your opinion do you have the ability to successfully pursue a graduate or professional degree? (Circle one.)

No	1	(50)
Probably no	2	
Probably yes	3	
Yes	4	

---

17. Of your close friends in college, how many are planning to go on for graduate or professional studies? (Circle one.)

All or almost all	1	(51)
More than half	2	
Less than half	3	
Few or none	4	
Don't know	5	

---

18. Have you changed your major field of study since last summer or fall when you responded to the second survey? (Circle one.)

No. 1 (52)

Yes 2

19. Which of the following do you consider important requirements for a satisfying job or career? (Circle one in each row.)

	Highly Important	Important	Unimportant	
a. Provide me with an opportunity to use my special abilities and aptitudes. . . .	1	2	3	(53)
b. Provide me with a chance to earn a good deal of money	1	2	3	(54)
c. Give me an opportunity to live and work in the world of ideas	1	2	3	(55)
d. Provide me an opportunity to work on the application of knowledge to practical affairs	1	2	3	(56)
e. Provide me an opportunity to work on theoretical problems regardless of practical value	1	2	3	(57)
f. Permit me to be creative and original . . .	1	2	3	(58)
g. Give me social status and prestige.	1	2	3	(59)
h. Give me opportunities to work with people rather than things.	1	2	3	(60)
i. Enable me to look forward to a stable, secure future	1	2	3	(61)
j. Leave me relatively free of supervision by others.	1	2	3	(62)
k. Give me a chance to exercise leadership . .	1	2	3	(63)
l. Provide me with adventure	1	2	3	(64)
m. Give me an opportunity to be helpful to others.	1	2	3	(65)

20. Think of the teacher who had the greatest influence on you during the past academic year, and please answer the following questions concerning him or his course(s):

a. Did he influence you to change your plans about the career you will enter after college? (Circle one.)

No 1 (66)

Yes. 2

(Item Continued on Next Page)

b. Did he encourage you to pursue a graduate or professional degree? (Circle one.)

No 1 (67)
Yes. 2

---

c. Using the list of code numbers below for answering items 24 to 26, write in the boxes below the code number of the department or major field of this instructor:

☐☐ (68-69)

---

d. Did you take a course under this teacher last year? (Circle one.)

No 1 (70)
Yes. 2

ARE YOU SURE OR FAIRLY SURE THAT YOU WILL BE ATTENDING GRADUATE OR PROFESSIONAL SCHOOL THIS YEAR? (ACADEMIC YEAR, 1967-68)

IF YES: PUT AN "X" IN THIS BOX AND SKIP TO PAGE 8. ☐ 1 (71)

IF NO: ANSWER QUESTIONS 21 THROUGH 23, THEN PROCEED WITH THE NEXT SECTION.

---

21. Since you've been in college, have you at any time considered going on for graduate study or considered an occupation which would require professional training beyond a bachelor's degree? (Circle one.)

I never thought of it 1 (72)
I thought about it, but I never considered it seriously 2
I considered it seriously, but decided against it 3
I do plan to go on, but not this year 4

---

22. To what extent did immediate financial obstacles (not doubts about the long run economic value of further study) affect your decision regarding graduate or professional school this year? (Circle one.)

Financial obstacles had nothing to do with it 1 (73)
Financial obstacles played some part in my decision 2
Financial obstacles are the major reason I am not going on to further study this year 3

---

23. Which of the following best explains why you are not going to graduate or professional school this year? (Circle the one consideration most decisive in your planning.)

Lacked the motivation or desire to do graduate study immediately. . . . 1 (74)
Family responsibilities or financial obstacles made it impossible . . . 2
Did not have the grade record and academic qualifications to get admitted. 3
Had to go (or will have to go) into military service (could not get deferred) 4
Other (Circle and specify:______________________________
______________________________) 5

Major Field of Study and Anticipated Career

INSTRUCTIONS: The two-digit codes below can be used to describe a field of study or a type of job. Thus, for example, in answering Question 24 below about fields of study, select the code number corresponding to your undergraduate major field of study; in answering Question 26, which asks about your anticipated career field, select the code number corresponding to the occupation you expect to enter.

When you have chosen the field or occupation from the list which is your answer to one of the questions below, please write the two numbers or letters of that field in the double box at the end of that question. For example, if "Psychology" was your major field during the past year, write its code number (47) in the boxes at the end of Question 24 thus:

4	7

IMPORTANT NOTE: Certain code numbers should be used only for coding occupations, not for coding major field of study. Students who plan careers as Elementary Teachers or Secondary School Teachers should use "Education" codes only to describe their anticipated careers; they should code their major fields of study according to the academic field in which they are majoring. Students who plan careers as college or university teachers should code both their major field of study and their anticipated careers according to the appropriate academic field codes.

LIST OF MAJOR FIELDS AND OCCUPATIONS

01 Agricultural and Related Fields
- 02 Agricultural Sciences (including Animal Husbandry, Agronomy, Farm Management, Horticulture, Soil Science, Soil Conservation, etc.)
- 03 Forestry, Fish and Wild Life Management
- 04 Farming (code as occupation only, not as field of study)

05 Business and Administration
- 06 Accounting
- 08 All other business and commercial fields (Business Administration, Marketing, Insurance, Finance, Industrial Relations, etc.)

09 Biological Sciences
- 10 Biology
- 11 Biochemistry
- 13 Biophysics
- 14 Physiology
- 15 Zoology
- 16 Other Biological Science Fields

Education (code as occupation only)
- 17 Elementary School Teacher (including Kindergarten and Nursery School)
- 18 Secondary School Teacher

Engineering
- 20 Civil (including Agricultural, Architectural, Civil, Sanitary)
- 21 Chemical (including Ceramic)
- 22 Electrical
- 23 Mechanical
- 24 Metallurgical
- 25 Mining
- 26 Engineering, General and other specialties

Health Professions
- 27 Dentistry
- 28 Medicine
- 29 Nursing
- 30 Pharmacy
- 31 Veterinary Medicine
- 32 Medical Technology or Dental Hygiene
- 33 Other Health Fields or Occupations

Humanities
- 34 Fine and Applied Arts (Art, Music, Speech, Drama, etc.)
- 35 English, Creative Writing
- 36 Classical Languages and Literatures
- 37 Modern Foreign Languages and Literatures
- 38 Philosophy

39 Law (Code as professional field or occupation only)

40 Mathematics and Statistics (NOTE: Secondary School Mathematics Teaching is classified under Education)

Physical Science (NOTE: Secondary School Science Teaching is classified under Education)
- 42 Chemistry (excluding Biochemistry which is 11)
- 43 Physics (excluding Biophysics which is 13)
- 44 Geography
- 45 Geology, Geophysics
- 46 Physical Science, General and other specialties

47 Psychology
- 48 Clinical Psychology (code as graduate field or occupation only)
- 49 Other psychology specialties (code as graduate field or occupation only)

Social Sciences
- 50 Anthropology, Archeology
- 51 Economics
- 52 History
- 53 Political Science, Government, International Relations
- 54 Sociology
- 55 Social Science, General and Other

Other Fields and Occupations

56 Architecture, City Planning
57 Foreign Service (Code as occupation only, not field of study)
58 Home Economics (Code either as a field of study or as an occupation if you mean working as a home economist for pay)
59 Housewife (Code as occupation only, not as field of study)
60 Journalism, Radio-Television, Communications
61 Library Science, Archival Science
62 Social Work, Group Work
63 Theology, Religion (Employment as a Clergyman or religious worker)

70 Field of Study or Job Which has no Near Equivalent in This List
(If you use this code, please describe your field or career in a word or two under the questions where it applies.)

---

24. What was your major field of study during the past year?

If you had a joint major, give the one with the most course credits.

☐☐ (75-76)

---

25. Future graduate or professional major?

Please enter the code number of the field in which you now plan to do graduate or professional study. If you plan study in several fields, give the main one.

If you do not plan to ever go to graduate or professional school, write "XX" in the boxes.

☐☐ (77-78)

---

26. Anticipated career field?

Please give what you expect to be your long-run career and ignore any school, stop-gap, or temporary military service which might precede it.

If you are a woman, use "Housewife (59)" only if you do not expect to work full time until your children are grown.

☐☐ (79-80)

Descriptions of Your Undergraduate Environment

NOTE: The purpose of this section is to obtain information about your undergraduate environment during the past school year.

Although you answered a similar set of items last year, your college environment has undoubtedly changed in several respects since you last reported. We want to study permanence and change in college environments and to relate such changes to the development of student career plans. So please complete the following items even though many of them are similar to items in the survey you completed last year.

You are asked to be a reporter about those parts of your college you have known best. You have lived in a particular college environment, participated in its activities, seen its features, and sensed its expectations and demands. What kind of place was it?

Remember, your responses will be kept confidential; no person, except those working on this research project, will ever see your responses. Your responses will not be used to evaluate your teachers, your fellow students, or your college. They will be used only to study the effects of different environments upon career plans. There are no "right" or "wrong" answers; so please answer the questions honestly and try to estimate the degree to which the statements below characterized your college environment last year.

INSTRUCTIONS FOR PART A: Statements in PART A are about faculty members with whom you have had most of your courses or have known best during the past year--their courses and teaching methods, their values and emphases, and their formal and informal interactions with you. The ratings you make here may or may not correspond to the ratings you would make of faculty members in other parts of the college or university. We do not want you to describe all faculty members in your school. Think only of the teachers with whom you have had most of your courses or known best during the past year. We want you to describe their behavior and the effects of their behavior upon you.

DIRECTIONS: Please rate your teachers according to the degree to which each of the following statements describes their behavior, or the effects of their behavior upon you. The numbers in the rating scale should be interpreted as follows:

1 -- Strongly disagree; highly uncharacteristic and almost always false as a description of them.

2 -- Mostly disagree; mostly false as a description of them.

3 -- Neither agree nor disagree; true about as often as it was false as a description of them.

4 -- Mostly agree; mostly true as a description of them.

5 -- Strongly agree; highly characteristic and almost always true as a description of them.

CIRCLE THE NUMBER WHICH CORRESPONDS TO YOUR RATING FOR EACH DESCRIPTION

How the rating scale is to be used can be illustrated with the following statement:

"The faculty participated with students in many out-of-class activities."

If you should "mostly agree" that this statement characterized your teachers last year, you would mark as follows:

	Disagree			Agree	
The faculty participated with students in many out-of-class activities.	1	2	3	[✓ 4]	5

PART A -- DESCRIPTIONS OF FACULTY MEMBERS

PLEASE ANSWER EVERY ITEM IN PART A

		Disagree			Agree		
27.	They seemed to have little genuine enthusiasm for the intellectual life.	1	2	3	4	5	(7)
28.	They were sensitive to student complaints and grievances and frequently tried to remedy the situation.	1	2	3	4	5	(8)
29.	They offered many really practical courses designed to prepare the student for his occupation.	1	2	3	4	5	(9)
30.	They did little to help the student develop his imaginative and creative capacities.	1	2	3	4	5	(10)
31.	They usually demanded strict compliance with all course requirements.	1	2	3	4	5	(11)
32.	The grades they gave me suggested that I was not unusually qualified for graduate work in the field.	1	2	3	4	5	(12)
33.	They showed no interest in tracing the sources of their specialized field of study to philosophical or humanistic movements in the history of ideas.	1	2	3	4	5	(13)
34.	They encouraged students to do graduate work.	1	2	3	4	5	(14)
35.	They often stressed the limited usefulness of the concepts and methods of science.	1	2	3	4	5	(15)
36.	On the whole I am grateful to them for showing me a way of life worthy of imitation.	1	2	3	4	5	(16)
37.	Their lectures clearly revealed they had put a great deal of energy and thought into doing a good job of teaching.	1	2	3	4	5	(17)
38.	They were not unusually skillful in getting to know students as individuals.	1	2	3	4	5	(18)
39.	They clearly conveyed to me a sense of what it means to become deeply involved in a discipline or subject.	1	2	3	4	5	(19)

115B

PART A -- DESCRIPTIONS OF FACULTY MEMBERS

	Disagree			Agree		
40. Students having difficulty with their courses could not expect to get special tutoring or counsel from them.	1	2	3	4	5	(20)
41. They rarely tried to give the student the practical training he will need in his career field.	1	2	3	4	5	(21)
42. They felt free to go into absolutely anything in trying to get students to develop their individual interests.	1	2	3	4	5	(22)
43. They sometimes waived requirements for admission to their courses.	1	2	3	4	5	(23)
44. Their evaluations of my academic performance convinced me that I had a flair for course work in this area.	1	2	3	4	5	(24)
45. They frequently encouraged students to take courses in the humanities.	1	2	3	4	5	(25)
46. They spent little or no time counseling students about opportunities for graduate study in their field.	1	2	3	4	5	(26)
47. They stressed the value of the objective methods of science in finding answers to empirical questions.	1	2	3	4	5	(27)
48. By and large they were not the kind of person I'd like to be.	1	2	3	4	5	(28)
49. Their lectures were occasionally somewhat rambling and unorganized.	1	2	3	4	5	(29)
50. They really talked with the students, not just at them.	1	2	3	4	5	(30)
51. They were mostly content to follow their art or field of knowledge desultorily or superficially.	1	2	3	4	5	(31)
52. They expected the undergraduate to get by almost completely on his own resources.	1	2	3	4	5	(32)
53. Very few of their courses were aimed at preparing the student for his vocation.	1	2	3	4	5	(33)
54. They typically adjusted assignments and projects to fit the student's unique interests.	1	2	3	4	5	(34)
55. They were very reluctant to approve any exceptions in the curriculum requirements for graduation.	1	2	3	4	5	(35)
56. They provided personal evaluations of my ability which made me realize I had potentiality as a contributor in my field of study.	1	2	3	4	5	(36)
57. They seemed to have very little interest in drama or the arts.	1	2	3	4	5	(37)
58. They showed little interest in recruiting students into their field of study.	1	2	3	4	5	(38)
59. They sometimes criticized the trivial problems on which many scientists choose to work.	1	2	3	4	5	(39)
60. A few of them were the kind of person one can't help using as a model for oneself.	1	2	3	4	5	(40)
61. They were extremely efficient and skillful in their use of class time.	1	2	3	4	5	(41)
62. They took a personal interest in me and my work.	1	2	3	4	5	(42)

PART A -- DESCRIPTIONS OF FACULTY MEMBERS

	Disagree			Agree		
63. They typically exhibited great interest in, and enthusiasm about, their field of study.	1	2	3	4	5	(43)
64. Their counseling and guidance were really personal, patient, and extensive.	1	2	3	4	5	(44)
65. They frequently expressed the belief that the main purpose of college is to prepare the student for his vocation.	1	2	3	4	5	(45)
66. They provided the student little or no opportunity to pursue independent study under their supervision.	1	2	3	4	5	(46)
67. They often permitted students to deviate somewhat from published curriculum requirements in their course work.	1	2	3	4	5	(47)
68. They rarely gave the student enough feedback on his work to really know what his strong points were.	1	2	3	4	5	(48)
69. They tried to get students interested in the humanities.	1	2	3	4	5	(49)
70. They tried to persuade qualified students to seek advanced training in their field of study.	1	2	3	4	5	(50)
71. They encouraged student interest in understanding developments in modern science.	1	2	3	4	5	(51)
72. They did not make much of a difference in my life beyond the specific information they imparted.	1	2	3	4	5	(52)
73. They often seemed bored with their teaching assignments.	1	2	3	4	5	(53)
74. I never got to know any of them well enough to count them as good friends.	1	2	3	4	5	(54)
75. They did not appear to have any strong and active research interests in their field of study.	1	2	3	4	5	(55)
76. They tried to restrict appointments for planning study programs to one or two periods during the year.	1	2	3	4	5	(56)
77. Their courses tended to make students more practical and realistic.	1	2	3	4	5	(57)
78. They urged their students to undertake independent research projects.	1	2	3	4	5	(58)
79. They were relatively permissive when it came to enforcing rules regarding course prerequisites.	1	2	3	4	5	(59)
80. They made little effort to give special recognition to students who did exceptional work.	1	2	3	4	5	(60)
81. Student interest in understanding and criticizing important works in art, music, and drama was encouraged by the faculty.	1	2	3	4	5	(61)
82. They taught their courses as if most of their students were going into graduate study.	1	2	3	4	5	(62)
83. It was obvious that they believed the American college has overemphasized education in the sciences.	1	2	3	4	5	(63)
84. Most of their opinions and values still seem somewhat alien and ivory-towered to me.	1	2	3	4	5	(64)
85. In their lectures the presentation of material was extremely well planned and illustrated.	1	2	3	4	5	(65)

PART A -- DESCRIPTIONS OF FACULTY MEMBERS

	Disagree 1	2	3	Agree 4	5	
86. They were typically warm and friendly in their relations with me.	1	2	3	4	5	(66)
87. It was obvious that they had fallen in love with the search for knowledge.	1	2	3	4	5	(67)
88. They often discussed the students' goals with them and tried to help them discover their special talents.	1	2	3	4	5	(68)
89. Very few of their courses here will be useful to students who go into business or industry.	1	2	3	4	5	(69)
90. They were too busy to hunt for ways of getting students to develop initiative.	1	2	3	4	5	(70)
91. They were inflexible in enforcing deadlines for course requirements.	1	2	3	4	5	(71)
92. They gave me extensive, evaluative comments on my term papers and examinations in their courses.	1	2	3	4	5	(72)
93. They had little appreciation for scholarship in the humanities.	1	2	3	4	5	(73)
94. They did not present much information about careers in their field of study.	1	2	3	4	5	(74)
95. They frequently encouraged students to take elective courses in the sciences.	1	2	3	4	5	(75)
96. I admired most of them as persons not just as professors.	1	2	3	4	5	(76)
97. Some of them were typically not adequately prepared to lecture on the day's topic.	1	2	3	4	5	(77)
98. They seemed to feel that teachers should maintain a certain amount of "emotional distance" from students.	1	2	3	4	5	(78)

99. Are most of the faculty members you have just described in your major field of study? (Circle one.)

Yes 1 (7)
No. 2

PART B -- DESCRIPTIONS OF STUDENT ASSOCIATES

INSTRUCTIONS FOR PART B: Statements in PART B are about the undergraduate colleagues you knew best during the past year. Your answers to this part should tell us what was generally characteristic of the undergraduate students you knew best, identified with, or associated with most commonly during the past year. The ratings you make for your personal associates in your undergraduate school may or may not correspond to the way you would rate undergraduate students in general or other groups of students at your college.

Describe only those students you knew best and associated with most commonly during the past year. They may, or may not, be students in your major field, living quarters or campus clubs.

100. Are most of the student colleagues you will be describing in your major field of study? (Circle one.)

Yes 1 (8)
No. 2

PART B -- DESCRIPTIONS OF STUDENT ASSOCIATES

DIRECTIONS: Follow the same rating directions shown for Part A.

PLEASE ANSWER EVERY ITEM IN PART B

		Disagree			Agree		
101.	They had strong interests in poetry, music, painting, sculpture, architecture, etc.	1	2	3	4	5	(9)
102.	Getting top grades was of little importance to most of my associates.	1	2	3	4	5	(10)
103.	Few of them were eager to go out and start working in the practical world.	1	2	3	4	5	(11)
104.	Books dealing with psychological problems or personal values were widely read and discussed by them.	1	2	3	4	5	(12)
105.	On the whole they had greater difficulty competing for grades than I.	1	2	3	4	5	(13)
106.	Most of my friends were planning to enter careers which required graduate or professional degrees.	1	2	3	4	5	(14)
107.	They talked frequently about the philosophy and methods of science.	1	2	3	4	5	(15)
108.	Most of them felt their teachers had helped them to achieve greater direction, force, and clarity.	1	2	3	4	5	(16)
109.	We shared with each other the excitement of intellectual discoveries.	1	2	3	4	5	(17)
110.	Many of them owned sports cars.	1	2	3	4	5	(18)
111.	We rarely had much time for play or recreation.	1	2	3	4	5	(19)
112.	They would regard a student who insisted on analyzing and classifying art and music as a little odd.	1	2	3	4	5	(20)
113.	My friends were successful in getting mostly A's and B's in their courses last year.	1	2	3	4	5	(21)
114.	They often complained that their college courses were not giving them the practical training they will need in their career fields.	1	2	3	4	5	(22)
115.	They had very little interest in the analysis of value systems, and the relativity of societies and ethics.	1	2	3	4	5	(23)
116.	My associates were more talented and better equipped to pursue their studies than I.	1	2	3	4	5	(24)
117.	Few of them were seriously considering occupations which demand advanced graduate or professional training.	1	2	3	4	5	(25)
118.	They would have very little interest in attending a lecture by a prominent scientist.	1	2	3	4	5	(26)
119.	They were generally dissatisfied and disappointed with their teachers.	1	2	3	4	5	(27)
120.	My friends had no strong intellectual commitments.	1	2	3	4	5	(28)
121.	Most of them came from wealthy families.	1	2	3	4	5	(29)
122.	Their parties were frequent and a lot of fun.	1	2	3	4	5	(30)
123.	A lecture by an outstanding poet or dramatist would attract very few of them.	1	2	3	4	5	(31)

PART B -- DESCRIPTIONS OF STUDENT ASSOCIATES

		Disagree			Agree		
124.	They were critical of students who were content just to get by with grades of C.	1	2	3	4	5	(32)
125.	They often talked about the jobs that will be available to them after graduation from college.	1	2	3	4	5	(33)
126.	They would have little interest in a lecture by a visiting philosopher or theologian.	1	2	3	4	5	(34)
127.	Most of my associates had higher grade point averages than I.	1	2	3	4	5	(35)
128.	None of them had much interest in doing research in their field of study.	1	2	3	4	5	(36)
129.	They rarely took any more science courses than were required.	1	2	3	4	5	(37)
130.	Most of my associates were grateful to the faculty for showing them a way of life worthy of imitation.	1	2	3	4	5	(38)
131.	They tended to avoid students who liked to exercise their intellectual abilities.	1	2	3	4	5	(39)
132.	Many of them had to work part-time to pay their college expenses.	1	2	3	4	5	(40)
133.	Our gathering places were typically active and noisy.	1	2	3	4	5	(41)
134.	When they got together they often talked about trends in art, music, or the theater.	1	2	3	4	5	(42)
135.	They had little use for "grinds" who constantly studied hard to get top grades.	1	2	3	4	5	(43)
136.	They tended to look down on students who insisted on evaluating courses in terms of how well they prepared one for a job.	1	2	3	4	5	(44)
137.	They frequently debated social and political problems far into the night.	1	2	3	4	5	(45)
138.	College was easier for me than for my friends.	1	2	3	4	5	(46)
139.	Many of them had a strong desire to contribute to their field of study.	1	2	3	4	5	(47)
140.	Most of my friends had strong interests in science and mathematics.	1	2	3	4	5	(48)
141.	They were often caught up in the contagious enthusiasms of their teachers.	1	2	3	4	5	(49)
142.	We often had long, serious intellectual discussions.	1	2	3	4	5	(50)
143.	Few of them ever expected to become wealthy.	1	2	3	4	5	(51)
144.	There weren't many opportunities for us to get together in extra-curricular activities.	1	2	3	4	5	(52)
145.	They often went to concerts and art exhibits when they were available.	1	2	3	4	5	(53)
146.	They attached little importance to how well they did relative to others in their courses.	1	2	3	4	5	(54)
147.	They were more concerned about taking interesting courses than courses directly useful in their vocations.	1	2	3	4	5	(55)
148.	Long, serious philosophical discussions were common among them.	1	2	3	4	5	(56)

PART B -- DESCRIPTIONS OF STUDENT ASSOCIATES

	Disagree			Agree		
149. In comparing their abilities with mine I never felt particularly handicapped.	1	2	3	4	5	(57)
150. They had little interest in pursuing careers involving research or scholarship.	1	2	3	4	5	(58)
151. Few, if any, of them would like to engage in scientific research.	1	2	3	4	5	(59)
152. They had strategies for helping each other to meet the faculty's requirements with less work.	1	2	3	4	5	(60)
153. They always enjoyed exploring ideas with each other.	1	2	3	4	5	(61)
154. They were accustomed to having plenty of money.	1	2	3	4	5	(62)
155. We seldom went to movies, parties, etc., on the spur of the moment.	1	2	3	4	5	(63)
156. They seemed to have little appreciation for the fine or applied arts.	1	2	3	4	5	(64)
157. Their grades indicated they were an unusually capable group relative to others in the college.	1	2	3	4	5	(65)
158. Most of them believed that the main goal of a college education is to prepare the student for his vocational career.	1	2	3	4	5	(66)
159. They never talked very much about ethical perplexities.	1	2	3	4	5	(67)
160. The extremely high calibre of my student colleagues put a lot of pressure on me.	1	2	3	4	5	(68)
161. I expect some of them to become eminent persons in their major fields of study.	1	2	3	4	5	(69)
162. Most of them were planning careers in science.	1	2	3	4	5	(70)
163. They sometimes ridiculed the faculty's mannerisms and ideas with wild caricatures.	1	2	3	4	5	(71)
164. They seemed to keep their intellectual concerns pretty much to themselves.	1	2	3	4	5	(72)
165. They tended to evaluate future jobs in terms of their intrinsic interest and had little concern about whether they offered one a chance to earn a great deal of money.	1	2	3	4	5	(73)
166. Everyone of us had a lot of fun in college.	1	2	3	4	5	(74)

IMPORTANT

You have now completed the questionnaire. Please fold it and return it in the enclosed stamped envelope to Project E, Department of Psychology, Vanderbilt University, Nashville, Tennessee 37203. Your replies to this questionnaire are completely confidential, and absolutely no information of any kind about specific persons will be released to your school or anyone else. Your questionnaire will be read only by the research staff working on this project.

A report of this project will be sent to you as soon as the results have been analyzed. In addition, information will be sent indicating one or more scientific or educational journals in which a more detailed account of the results of the study may be found. Thank you again for your cooperation.

APPENDIX C

TABLE C-1

Scales and Items Included in Faculty and Student Press Scales[a]

---

1. Faculty Enthusiasm for Intellectual Values

27. They seemed to have little genuine enthusiasm for the intellectual life. (F)
39. They clearly conveyed to me a sense of what it means to become deeply involved in a discipline or subject. (T)
51. They were mostly content to follow their art or field of knowledge desultorily or superficially. (F)
63. They typically exhibited great interest in, and enthusiasm about, their field of study. (T)
75. They did not appear to have any strong and active research interests in their field of study. (F)
87. It was obvious that they had fallen in love with the search for knowledge. (T)

2 Faculty Supportiveness

28. They were sensitive to student complaints and grievances and frequently tried to remedy the situation. (T)
40. Students having difficulty with their courses could not expect to get special tutoring or counsel from them. (F)
52. They expected the undergraduate to get by almost completely on his own resources. (F)
64. Their counseling and guidance were really personal, patient, and extensive. (T)
76. They tried to restrict appointments for planning study programs to one or two periods of the year. (F)
88. They often discussed the students' goals with them and tried to help them discover their special talents. (T)

3 Faculty Press for Vocationalism

29. They offered many really practical courses designed to prepare the student for his occupation. (T)
41. They rarely tried to give the student the practical training he will need in his career field. (F)
53. Very few of their courses were aimed at preparing the student for his vocation. (F)
65. They frequently expressed the belief that the main purpose of college is to prepare the student for his vocation. (T)
77. Their courses tended to make students more practical and realistic. (T)
89. Very few of their courses here will be useful to students who go into business or industry. (F)

4 Faculty Press for Independent Thinking

30. They did little to help the student develop his imaginative and creative capacities. (F)
42. They feld free to go into absolutely anything in trying to get students to develop their individual interests. (T)
54. They typically adjusted assignments and projects to fit the student's unique interests. (T)
66. They provided the student little or no opportunity to pursue independent study under their supervision. (F)
78. They urged their students to undertake independent research projects. (T)
90. They were too busy to hunt for ways of getting students to develop initiative. (F)

5 Faculty Press for Compliance

31. They usually demanded strict compliance with all course requirements. (T)
43. They sometimes waived requirements for admission to their courses. (F)
55. They were very reluctant to approve any exceptions in the curriculum requirements for graduation. (T)
67. They often permitted students to deviate somewhat from published curriculum requirements in their course work. (F)
79. They were relatively permissive when it came to enforcing rules regarding course prerequisites. (F)
91. They were inflexible in enforcing deadlines for course requirements. (T)

6 Faculty Evaluations of Ability

32. The grades they gave me suggested that I was not unusually qualified for graduate work in the field. (F)
44. Their evaluations of my academic performance convinced me that I had a flair for course work in this area. (T)
56. They provided personal evaluations of my ability which made me realize I had potentiality as a contributor in my field of study. (T)
68. They rarely gave the student enough feedback on his work to really know what his strong points were. (F)
80. They made little effort to give special recognition to students who did exceptional work. (F)
92. They gave me extensive, evaluative comments on my term papers and examinations in their courses. (T)

7 Faculty Press for Humanities

33. They showed no interest in tracing the sources of their specialized field of study to philosophical or humanistic movements in the history of ideas. (F)
45. They frequently encouraged students to take courses in the humanities. (T)
57. They seemed to have very little interest in drama or the arts. (F)
69. They tried to get students interested in the humanities. (T)
81. Student interest in understanding and criticizing important works in art, music, and drama was encouraged by the faculty. (T)
93. They had little appreciation for scholarship in the humanities. (F)

8 Faculty Press for Advanced Training

34. They encouraged students to do graduate work. (T)
46. They spent little or no time counseling students about opportunities for graduate study in their field. (F)
58. They showed little interest in recruiting students into their field of study. (F)
70. They tried to persuade qualified students to seek advanced training in their field of study. (T)
82. They taught their courses as if most of their students were going into graduate study. (T)
94. They did not present much information about careers in their field of study. (F)

9 Faculty Press for Science

35. They often stressed the limited usefulness of the concepts and methods of science. (F)
47. They stressed the value of the objective methods of science in finding answers to empirical questions. (T)
59. They sometimes criticized the trivial problems on which many scientists choose to work. (F)
71. They encouraged student interest in understanding developments in modern science. (T)
83. It was obvious that they believed the American college has overemphasized education in the sciences. (F)
95. They frequently encouraged students to take elective courses in the sciences. (T)

10 Faculty Adequacy as Positive Role Models

36. On the whole I am grateful to them for showing me a way of life worthy of imitation. (T)
48. By and large they were not the kind of person I'd like to be. (F)
60. A few of them were the kind of person one can't help using as a model for oneself. (T)

72. They did not make much of a difference in my life beyond the specific information they imparted. (F)
84. Most of their opinions and values still seem somewhat alien and ivory-towered to me. (F)
96. I admired most of them as persons not just as professors. (T)

11 Faculty Excellence of Teaching

37. Their lectures clearly revealed they had put a great deal of energy and thought into doing a good job of teaching. (T)
49. Their lectures were occasionally somewhat rambling and unorganized. (F)
61. They were extremely efficient and skillful in their use of class time. (T)
73. They often seemed bored with their teaching assignments. (F)
85. In their lectures the presentation of material was extremely well planned and illustrated. (T)
97. Some of them were typically not adequately prepared to lecture on the day's topic. (F)

12 Faculty Press for Affiliation

38. They were not unusually skillful in getting to know students as individuals. (F)
50. They really talked with the students, not just at them. (T)
62. They took a personal interest in me and my work. (T)
74. I never got to know any of them well enough to count them as good friends. (F)
86. They were typically warm and friendly in their relations with me. (T)
98. They seemed to feel that teachers should maintain a certain amount of "emotional distance" from students. (F)

13 Student Press for Estheticism

101. They had strong interest in poetry, music, painting, sculpture, architecture, etc. (T)
112. They would regard a student who insisted on analyzing and classifying art and music as a little odd. (F)
123. A lecture by an outstanding poet or dramatist would attract very few of them. (F)
134. When they got together they often talked about trends in art, music, or the theater. (T)
145. They often went to concerts and art exhibits when they were available. (T)
156. They seemed to have little appreciation for the fine or applied arts. (F)

14 Student Press for Academic Achievement

102. Getting top grades was of little importance to most of my associates. (F)
113. My friends were successful in getting mostly A's and B's in their courses last year. (T)
124. They were critical of students who were content just to get by with grades of C. (T)
135. They had little use for "grinds" who constantly studied hard to get top grades. (F)
146. They attached little importance to how well they did relative to others in their courses. (F)
157. Their grades indicated they were an unusually capable group relative to others in the college. (T)

15 Student Press for Vocationalism

103. Few of them were eager to go out and start working in the practical world. (F)
114. They often complained that their college courses were not giving them the practical training they will need in their career fields. (T)
125. They often talked about the jobs that will be available to them after graduation from college. (T)
136. They tended to look down on students who insisted on evaluating courses in terms of how well they prepared one for a job. (F)
147. They were more concerned about taking interesting courses than courses directly useful in their vocations. (F)
158. Most of them believed that the main goal of a college education is to prepare the student for his vocational career. (T)

16 Student Press for Reflectiveness

104. Books dealing with psychological problems or personal values were widely read and discussed by them. (T)
115. They had very little interest in the analysis of value systems, and the relativity of societies and ethics. (F)
126. They would have little interest in a lecture by a visiting philosopher or theologian. (F)
137. They frequently debated social and political problems far into the night. (T)
148. Long, serious philosophical discussions were common among them. (T)
159. They never talked very much about ethical perplexities. (F)

17 Student Press for Unfavorable Self-Evaluation

105. On the whole they had greater difficulty competing for grades than I. (F)
116. My associates were more talented and better equipped to pursue their grades than I. (T)

127. Most of my associates had higher grade point averages than I. (T)
138. College was easier for me than for my friends. (F)
149. In comparing their abilities with mine I never felt particularly handicapped. (F)
160. The extremely high calibre of my student colleagues put a lot of pressure on me. (T)

18 Student Press for Advanced Training

106. Most of my friends were planning to enter careers which required graduate or professional degrees. (T)
117. Few of them were seriously considering occupations which demand advanced graduate or professional training. (F)
128. None of them had much interest in doing research in their field of study. (F)
139. Many of them had a strong desire to contribute to their field of study. (T)
150. They had little interest in pursuing careers involving research or scholarship. (F)
161. I expect some of them to become eminent persons in their major fields of study. (T)

19 Student Press for Science

107. They talked frequently about the philosophy and methods of science. (T)
118. They would have very little interest in attending a lecture by a prominent scientist. (F)
129. They rarely took any more science courses than were required. (F)
140. Most of my friends had strong interests in science and mathematics. (T)
151. Few, if any, of them would like to engage in scientific research. (F)
162. Most of them were planning careers in science. (T)

20 Student Press for Opposition to Faculty Influence

108. Most of them felt their teachers had helped them to achieve greater direction, force, and clarity. (F)
119. They were generally dissatisfied and disappointed with their teachers. (T)
130. Most of my associates were grateful to the faculty for showing them a way of life worthy of imitation. (F)
141. They were often caught up in the contagious enthusiasms of their teachers. (F)
152. They had strategies for helping each other to meet the faculty's requirements with less work. (T)
163. They sometimes ridiculed the faculty's mannerisms and ideas with wild caricatures. (T)

21 Student Press for Intellectualism

109. We shared with each other the excitement of intellectual discoveries. (T)
120. My friends had no strong intellectual commitments. (F)
131. They tended to avoid students who liked to exercise their intellectual abilities. (F)
142. We often had long, serious intellectual discussions. (T)
153. They always enjoyed exploring ideas with each other. (T)
164. They seemed to keep their intellectual concerns pretty much to themselves. (F)

22 Student Press for Affluence

110. Many of them owned sports cars. (T)
121. Most of them came from wealthy families. (T)
132. Many of them had to work part-time to pay their college expenses. (F)
143. Few of them ever expected to become wealthy. (F)
154. They were accustomed to having plenty of money. (T)
165. They tended to evaluate future jobs in terms of their intrinsic interest and had little concern about whether they offered one a chance to earn a great deal of money. (F)

23 Student Press for Playfulness

111. We rarely had much time for play or recreation. (F)
122. Their parties were frequent and a lot of fun. (T)
133. Our gathering places were typically active and noisy. (T)
144. There weren't many opportunities for us to get together in extra-curricular activities. (F)
155. We seldom went to movies, parties, etc., on the spur of the moment. (F)
166. Everyone of us had a lot of fun in college. (T)

---

[a] Each press scale contained 6 items and each called for Likert-type ratings of degree of agreement on the following five-point rating scale: 1--Strongly disagree; highly uncharacteristic and almost always false as a description of them; 2--Mostly disagree; mostly false as a description of them; 3--Neither agree nor disagree; true about as often as it was false as a description of them; 4--Mostly agree; mostly true as a description of them; 5--Strongly agree; highly characteristic and almost always true as a description of them. The scoring weights used in computing scale scores were identical to the rating scale numbers for all items coded "T" in parentheses; for all items coded "F" scoring weights assigned to rating scale categories 1, 2, 3, 4, and 5 were 5, 4, 3, 2, and 1, respectively. Item numbers indicate the order in which items appeared on the survey questionnaires, and the specific numbers are those used on Survey No. 3.

TABLE C-2

Estimated Reliabilities of College Press Scale Scores Obtained on Each Survey

	Reliability Estimate[a]					
	1965		1966		1967	
College Press Scale	Men	Women	Men	Women	Men	Women
I. Faculty Press Scales						
1. Enthusiasm	.71	.79	.80	.77	.80	.83
2. Supportiveness	.75	.78	.77	.79	.76	.79
3. Vocationalism	.76	.74	.81	.75	.81	.80
4. Independent Thinking	.68	.77	.78	.80	.78	.82
5. Compliance	.68	.71	.75	.76	.79	.79
6. Evaluations of Ability	.63	.74	.67	.70	.75	.74
7. Humanities	.80	.75	.84	.82	.85	.85
8. Advanced Training	.72	.73	.77	.75	.76	.80
9. Science	.59	.48	.65	.63	.62	.66
10. Adequacy as Positive Role Models	.79	.80	.83	.83	.82	.85
11. Excellence of Teaching	.80	.84	.87	.86	.88	.86
12. Affiliation	.78	.83	.81	.82	.82	.83
II. Student Press Scales						
13. Estheticism	.86	.83	.86	.85	.88	.85
14. Academic Achievement	.60	.67	.66	.71	.71	.62
15. Vocationalism	.52	.60	.61	.67	.71	.67
16. Reflectiveness	.82	.79	.84	.83	.86	.82
17. Unfavorable Self-Evaluations	.75	.76	.77	.78	.75	.78
18. Advanced Training	.77	.77	.79	.81	.82	.79
19. Science	.84	.83	.85	.87	.86	.87
20. Opposition to Faculty Influence	.69	.74	.71	.73	.74	.74
21. Intellectualism	.83	.82	.80	.84	.83	.80
22. Affluence	.66	.70	.68	.73	.70	.71
23. Playfulness	.70	.70	.74	.74	.77	.76

[a] Scale reliabilities estimated by Kuder-Richardson formula 20 as extended by Ferguson (1951) for items with multiple response categories. Data are based on responses of 655 men and 523 women.

APPENDIX D

The Method of Contrasting Paired-Treatment and Internal Regressions

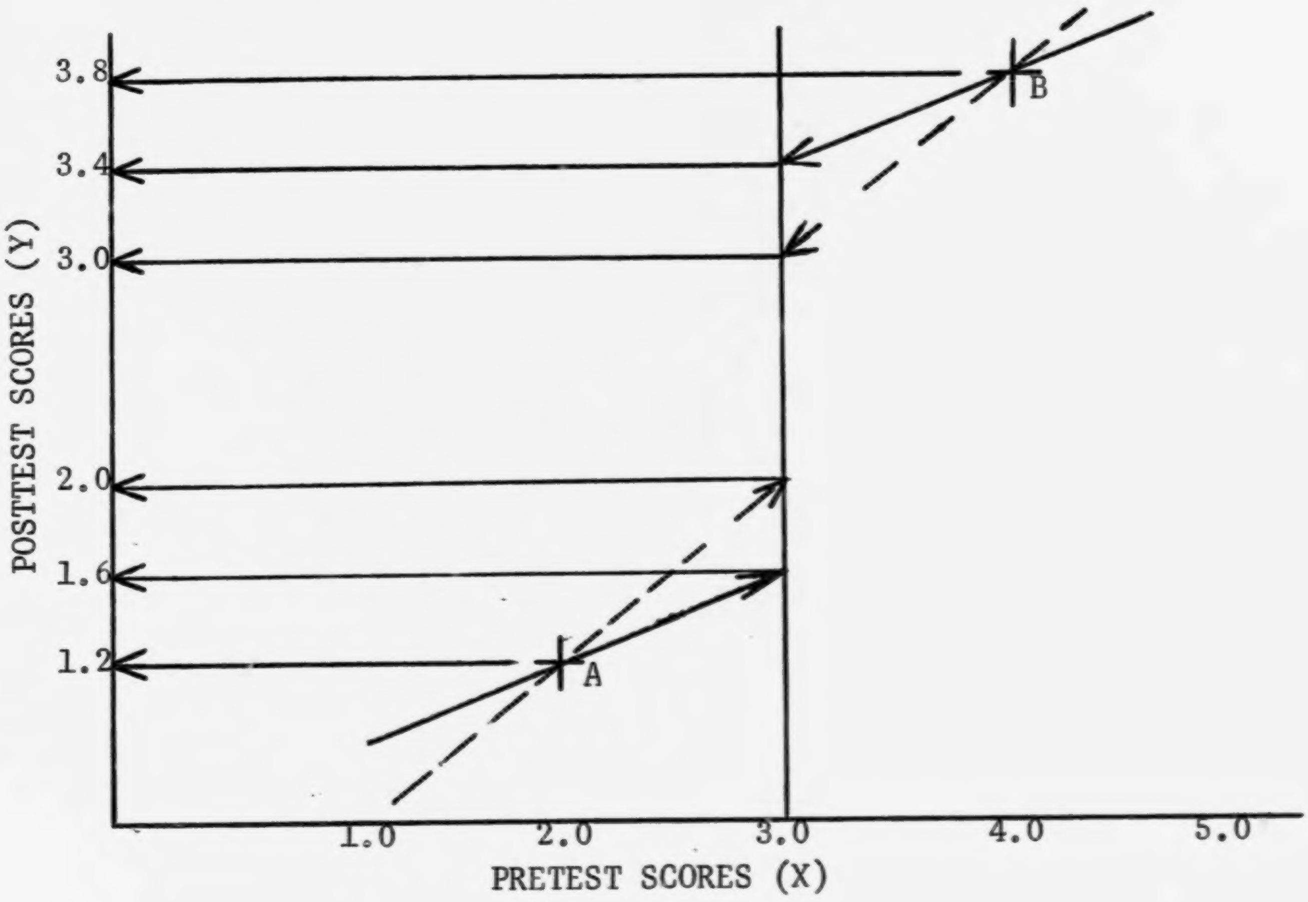
In this appendix certain conditions will be defined under which it is possible to predict the nature of the biases arising from the use of fallible covariables in analysis of covariance. The principle of contrasting internal and external regressions is developed first for the case in which there are only two treatment groups; it is then extended to multiple group comparisons. Throughout this analysis, an attempt is made to provide graphic illustrations of the procedures.

Underestimation of Adjustments in Conventional Covariance Analysis

Porter (36) has shown that the regression slope of posttest scores on true pretest scores is equal to the reciprocal of the reliability of the pretest times the regression slope of the posttest on the fallible pretest scores. For example, if the covariate, X, has a reliability of .5 and the slope of the regression of the dependent variable, Y, on X is .4, it follows that the slope of the regression of Y on estimated true scores on X is 1/.5 x .4, or .8. Thus in using the fallible regression coefficient (.4), instead of the true regression coefficient (.8), to make the usual covariance adjustments for group differences on the pretest, we are guilty of underestimating the required adjustments. In general, the lower the reliability of the covariate, the greater will be the discrepancy between the fallible and the true regression coefficients, and--assuming that there are group differences on the pretest--the greater will be the underadjustment for initial group differences.

Figure D-1 shows hypothetical means for hypothetical treatment groups A and B which for convenience are of equal size (as a result the mean pretest score for the combined groups lies midway between the pretest means of the two groups). The hypothetically observed internal regression slope (solid diagonal lines) and the true regression slope (dashed diagonal lines) have been accurately drawn to correspond to the given values (i.e., to the values of .4 and .8, respectively). The upper part of Figure D-1 shows the outcomes of a covariance analysis when there is an increment in the treatment-outcome correlation (cf. Chapter III). To reflect this condition groups A and B are shown with a mean difference of 2.0 on the pretest and a mean difference of 2.6 on the posttest. The obtained difference between the experimental treatments on the dependent variable (3.8 - 1.2 = 2.6) is reduced (3.4 - 1.6 = 1.8) when covariance adjustments are made on the basis of fallible scores on the covariable, but is reduced even further (3.0 - 2.0 = 1.0) when adjustments are made on the basis of true scores on the covariable. In this example, covariance adjustments on the basis of the fallible pretest scores lead to underadjustment of the groups for initial differences on the pretest, and presumably lead to a higher significance level than is warranted. Note, however, that in both the fallible and true score analysis the adjusted mean for group B exceeds that for group A.

INCREMENT IN TREATMENT-OUTCOME CORRELATION


3.8
3.4
3.0
2.0
1.6
1.2
POSTTEST SCORES (Y)
B
A
1.0
2.0
3.0
4.0
5.0
PRETEST SCORES (X)

DECREMENT IN TREATMENT-OUTCOME CORRELATION

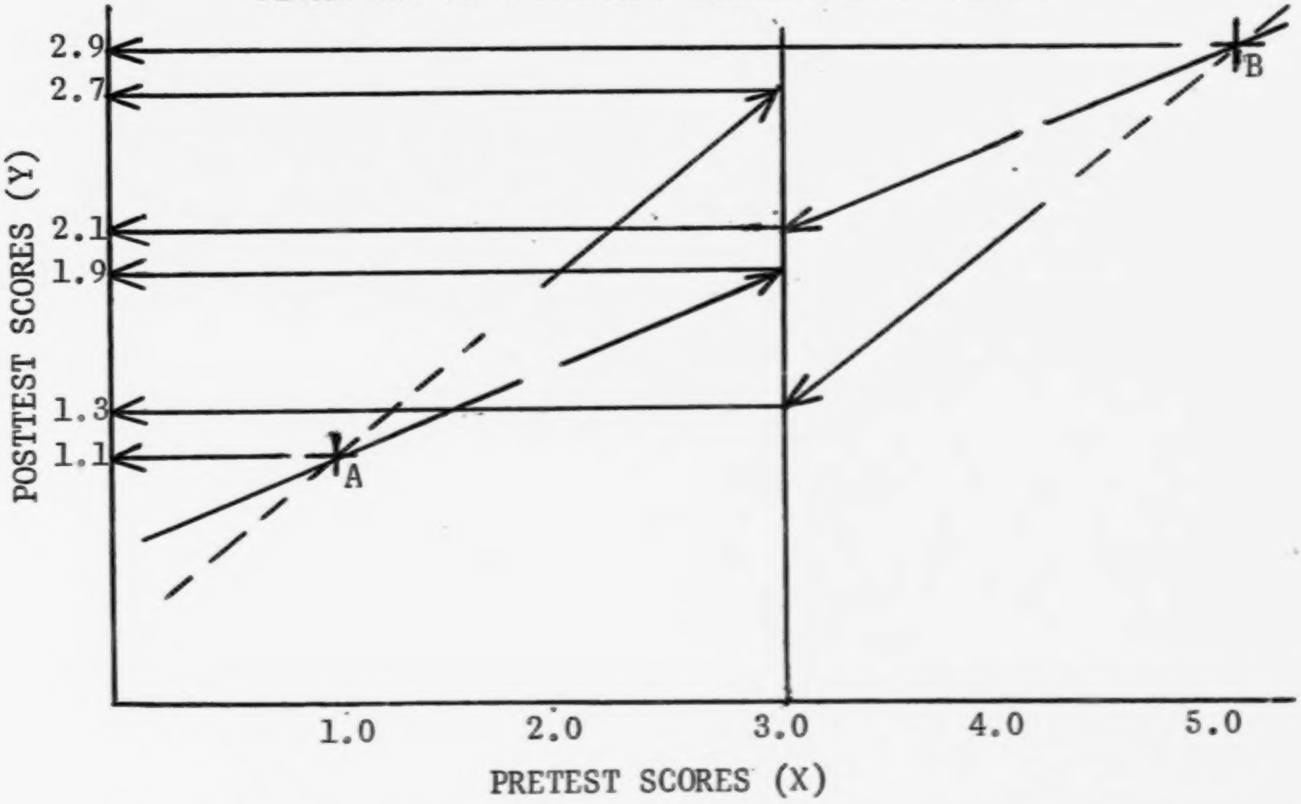

2.9
2.7
2.1
1.9
1.3
1.1
POSTTEST SCORES (Y)
B
A
1.0
2.0
3.0
4.0
5.0
PRETEST SCORES (X)

Fig. D-1. Covariance Adjustments in Cases with an Increase or Decrease in the Treatment-Outcome Correlation

In other words, the rank-order of the adjusted means was *not* altered in shifting from fallible to true scores on the covariate.

In the lower half of Figure D-1 similar regression lines and covariance adjustments are illustrated when there is a decrement in the treatment-outcome correlation. Thus the example shows a mean difference of 4.0 on the pretest but a mean difference of only 1.8 on the posttest. In this example, the obtained difference between treatments on the dependent variable, 1.8, is reduced to .2 when the adjustment is made on the basis of conventional covariance analysis. However, when the adjustment is made on the basis of true covariable scores the difference becomes -1.4. Moreover, the analysis now suggests that treatment A is superior to treatment B (i.e., the direction of the treatment effect is opposite to the effect estimated by the fallible adjustment). Again, the conventional covariance analysis has resulted in an *underadjustment* for initial differences on the pretest. However, in contrast to the first example where the conventional significance test seems likely to lead to a higher significance level than warranted, in the second example the conventional significance test seems likely to yield a lower significance level than warranted.

These examples explain the generalization described in Chapter III: the rank-order of adjusted means from fallible covariance analyses is likely to be accurate when there is an increment in the treatment-outcome correlation, but inaccurate when there is a decrement in this correlation. Thus, when the Y-means differ markedly while the X-means differ relatively little (an increment in treatment-outcome correlation) the projections on the vertical line equidistant from each group will tend to be greater for the same group regardless of whether one uses a flat or steep slope in making the projections. But when Y-means differ relatively little and X-means differ markedly (a decrement in treatment-outcome correlation) the projections on the vertical mid-line are likely to be higher for one group when using a flat slope, but higher for the other group when using a steep slope, in making the projections.

Can one define situations in which one can count on conventional covariance analysis yielding both relative accuracy of differences in adjusted means (as illustrated in the upper half of Figure D-1 and a conservative estimation of significance levels (as illustrated in the lower half of Figure D-1)? If so, then one could argue that in these situations conventional covariance analysis is merely conservative, and offers little danger of affirming spurious treatment effects. The next section offers a formulation of the desired conditions when there are only two treatment groups, and a later section suggests a way of generalizing the formulation to apply to groups of three of more.

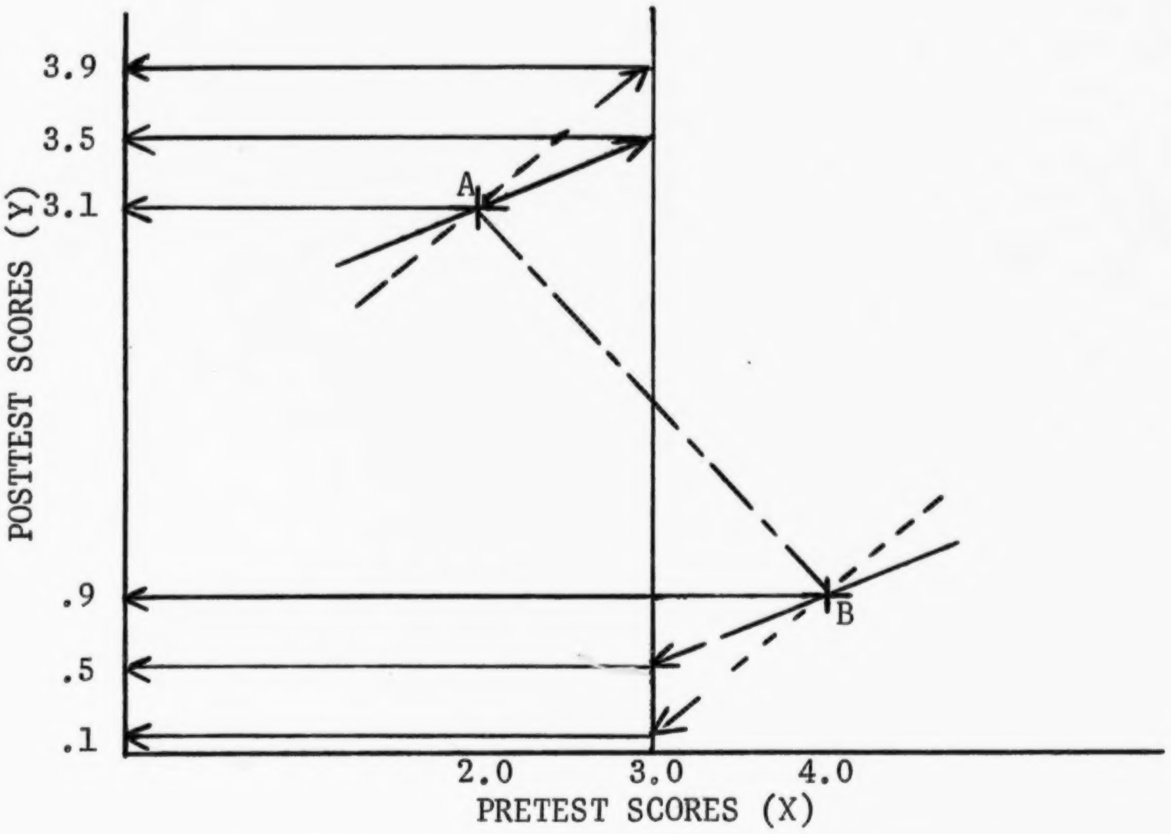
The External and Internal Regression Contrast

Let us say that the results of a conventional analysis of covariance are *non-spurious* when the latter reflects the same kind of treatment effect, as well as a more conservative estimate of the significance level of the effect, as compared with effects that would be obtained if the appropriate true-score covariance analysis had been performed. It can be shown that a conventional covariance is non-spurious, in the sense defined, when the effects of applying corrections for measurement error on the covariable could only be to increase the observed difference between the external and internal regression slopes.

If, in the upper half of Figure D-1, one draws a line connecting the two points A and B, this line defines the slope of the *external regression*. In the case of 3 or more groups, the best-fitting straight line passing through the points defined by the X- and Y-means of the groups would define the slope of the external regression. In contrast, the slopes we have already considered in Figure D-1 are within-group, or *internal*, regression slopes: the solid diagonal line through point A, for example, represents the *fallible internal regression*, while the dashed diagonal line through this point represents the *true-score internal regression*.

In general, a conventional covariance analysis will be non-spurious if: (a) *the fallible internal regression slope is positive and this slope exceeds the external regression slope*, or (b) *the fallible internal regression slope is negative, and the absolute value of this slope exceeds the external regression slope*. The first half of this formulation (part a) is illustrated in Figure D-2. As in the preceding figure, the fallible internal regressions (solid diagonal lines) and true-score internal regressions (dashed diagonal lines) have been accurately drawn with slope of .4 and .8, respectively, and the upper and lower halves of the figure represent cases in which there is an increment or decrement, respectively, in the treatment-outcome correlation. In both of the examples shown in Figure D-2 it is assumed that the observed within-group regression coefficient (.4) algebraically exceeds the external regression coefficient. The latter is indicated by the dashed-solid line connecting A and B; in the upper half of Figure D-2 the external regression slope is -1.10, while in the lower half of this figure the slope in -.33. In both cases, taking account of algebraic sign, the internal regression slope (.4) exceeds the external regression slope (-1.10 or -.33). The upper half of Figure 2 shows that the observed group differences on the dependent variables (3.1 - .9 = 2.2) is smaller than the difference between Y-scores adjusted on the basis of the fallible pretest scores (3.5 - .5 - 3.0), and the latter is smaller than the difference in Y-scores adjusted on the basis of true scores on the covariable (3.9 - .1 = 3.8). Similarly, in the lower half of this figure, the obtained difference in Y-scores, 1.0, is increased to 2.2 by adjustments on the fallible covariate and to 3.4 by adjustments on the hypothetical, error-free covariate. In other words, measurement errors on the covariable in these cases have had the effect of *decreasing* the difference in adjusted means, and presumably of leading to an underestimation of treatment effects. These examples suggest that covariance analysis is non-spurious, in the sense defined, when the within-groups regression slope is positive and exceeds the external regression slope.

INCREMENT IN TREATMENT-OUTCOME CORRELATION


3.9
3.5
3.1
.9
.5
.1
A
B
POSTTEST SCORES (Y)
2.0
3.0
4.0
PRETEST SCORES (X)

DECREMENT IN TREATMENT-OUTCOME CORRELATION

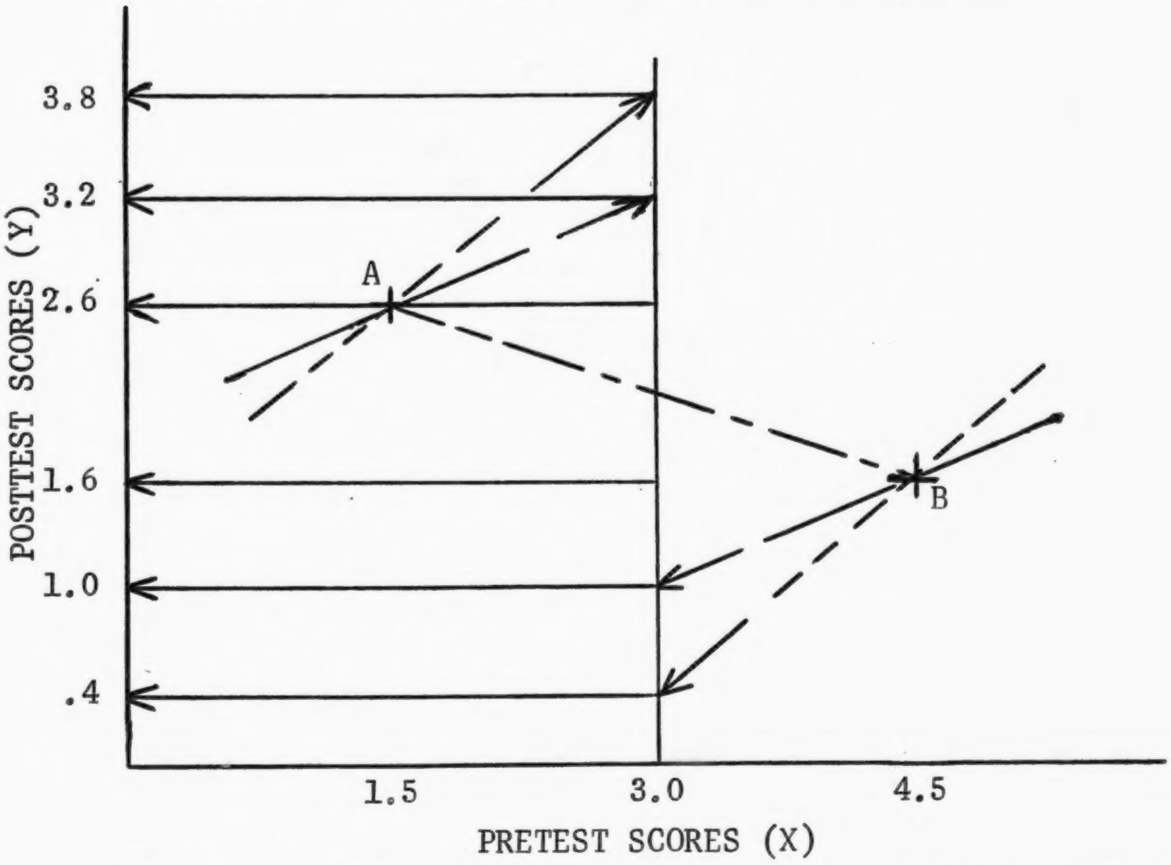

3.8
3.2
2.6
1.6
1.0
.4
A
B
POSTTEST SCORES (Y)
1.5
3.0
4.5
PRETEST SCORES (X)

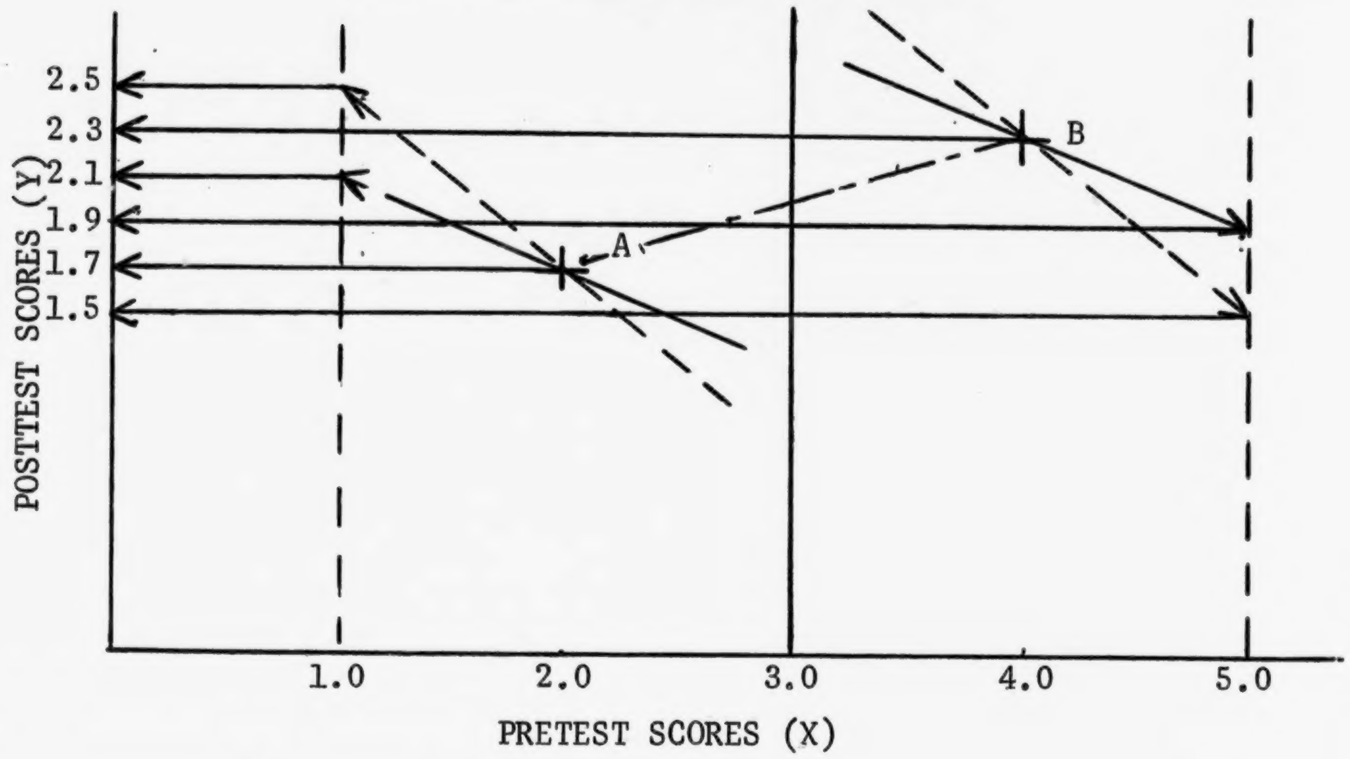
Fig. D-2. Covariance Adjustments in Cases Where Internal Regression Slopes Exceed External Regression Slopes

The second half of the formulation (part b) concerns cases in which the within-groups regression coefficient is negative, and it turns out that the projections which represent the appropriate covariance adjustments may best be shown on vertical lines which enclose the points, A and B. Thus cases involving negative internal regressions are represented in Figure D-3 by projections on vertical lines which deviate from the grand pretest mean by twice the amount of each treatment group's deviation. In analogy to the preceding figures it is assumed that the fallible internal regression slope is -.4 and the true internal regression slope is -.8. The upper half of this figure illustrates two groups juxtaposed so that the external regression slope is .3. The proposed regression criterion is satisfied since the absolute value of -.4 exceeds .3. It can be seen that the fallible covariance adjustment yields a treatment difference of .2 (2.1 - 1.9), while the adjustment on the basis of the error-free covariable yields a difference of 1.0 (2.5 - 1.5). Note that regardless of how steep the hypothetical true regression becomes, the fallible adjustment remains a conservative estimate of the true adjustment. The lower half of Figure D-3 illustrates the argument when there is a negative external regression slope. In this example, we assume the same internal regression slopes as before, but an external regression slope of -.5. The absolute value of -.4 (the observed internal regression slope) exceeds -.5, and therefore the regression criteria are satisfied. Again it may be seen that the difference in adjusted means based upon the fallible covariable (1.8) is a conservative estimate of the difference in adjusted means based upon the true covariable (2.6). Also it is clear that even though the true internal regression line may be steeper than has been assumed, the covariance analysis remains non-spurious in the sense defined.

Contrasts with Paired-Treatment Slopes

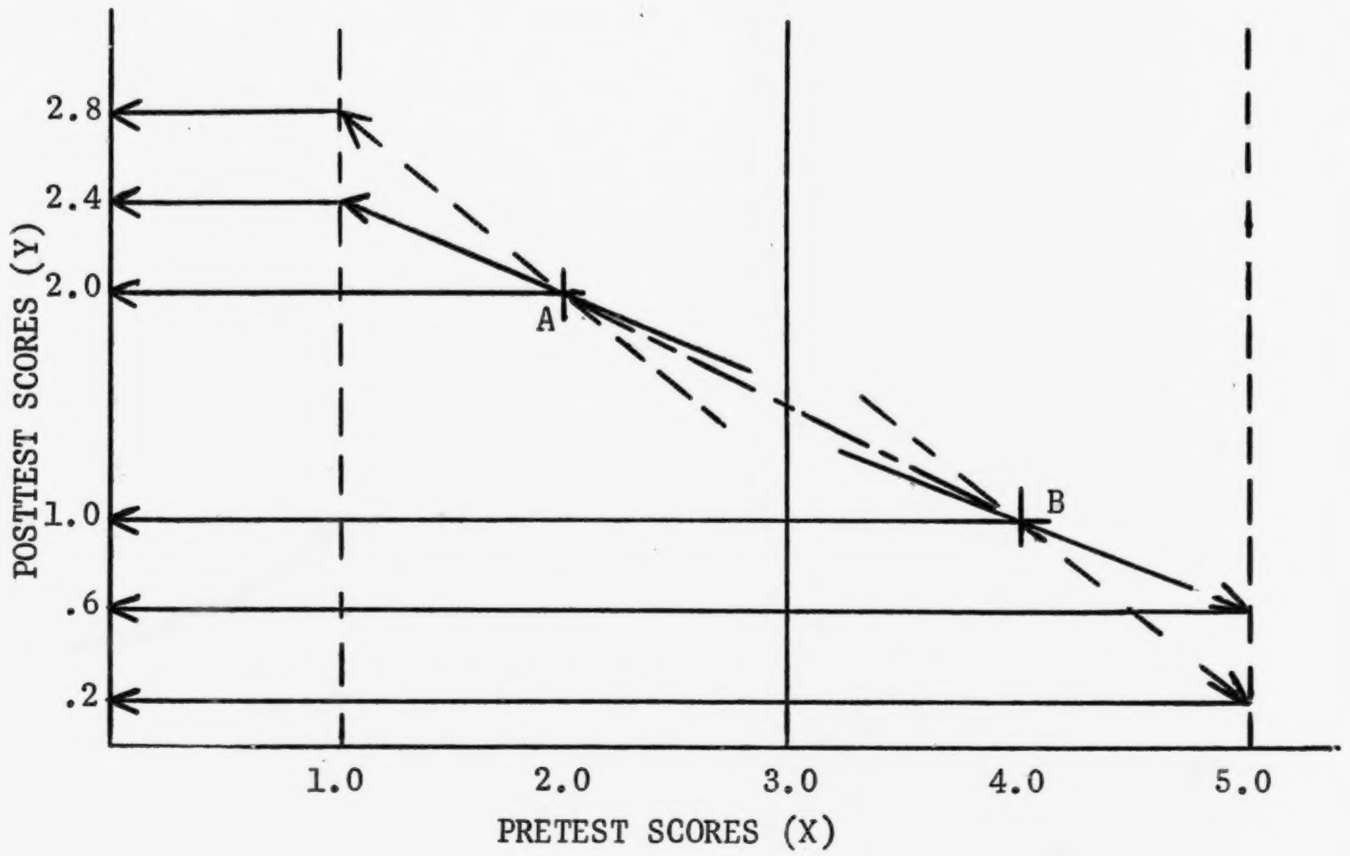
The preceding discussion and examples have assumed that there are only two treatment groups to be compared, but it is possible to extend the argument to multiple group comparisons. With three or more treatment groups, the external regression does not necessarily connect any two treatment means, but is the best fitting straight line through all points; it is therefore no longer of interest to us. Let us introduce the related, but distinct, concept of a "paired-treatment slope," which shall represent the slope of a line connecting the means for any pair of treatments. It is apparent that there are as many different paired-treatment slopes as there are different pairs of treatments to be compared. With this concept we may formulate the conditions under which measurement errors cannot vitiate a statistically significant difference between any two adjusted means, where adjustments have been made by conventional analysis of covariance. In general, such a comparison of adjusted means will be non-spurious (in the sense defined earlier) if: (a) the internal regression slope is positive and this slope exceeds the relevant paired-treatment slope, or (b) if the internal regression slope is negative and the absolute value of this slope exceeds the relevant paired-treatment slope. The proposed extension of the technique of regression

POSITIVE EXTERNAL REGRESSION SLOPE



2.5
2.3
2.1
1.9
1.7
1.5
POSTTEST SCORES (Y)
A
B
1.0
2.0
3.0
4.0
5.0
PRETEST SCORES (X)

NEGATIVE EXTERNAL REGRESSION SLOPE



2.8
2.4
2.0
1.0
.6
.2
POSTTEST SCORES (Y)
A
B
1.0
2.0
3.0
4.0
5.0
PRETEST SCORES (X)

Fig. D-3. Covariance Analysis in Cases Having Negative Internal Regressions and Positive or Negative External Regressions contrasts is illustrated in the next section.

Use of the Method in Assessing Effects of Entering a Field of Study

In Chapter III fallible and true-score analyses of covariance were reported for the data obtained from 1965 and 1967 scores on the scale, Faculty Press for Science (Table 17). We shall use this data to examine the validity of the conclusions to which we would be led by applying the proposed regression criteria in interpreting a conventional covariance analysis of these scores.

In Figure D-4 pretest and posttest means, together with the external regression slope (line BB) and fallible internal regression slope (line AA) have been accurately plotted. Since more than two groups are involved, we must consider contrasts involving paired treatment slopes. Dashed diagonal lines in Figure D-4 indicate the paired-treatment slopes for some 6 pairs of treatments. These represent pairs of treatments in which differences between adjusted means are both relatively large and appropriately compared according to the proposed criteria. In the preceding section, the first half of the formulation (part a) states that a comparison of adjusted means (calculated by conventional analysis of covariance) will be non-spurious when the internal regression slope is positive and this slope exceeds the relevant paired-treatment slope. It can be seen that each of the pair-treatment slopes drawn in Figure D-4 is negative, and therefore the specified criteria are satisfied.

Table D-1 summarizes differences in the effects, and significance levels of effects, of the 6 treatment pairs, as estimated both by (a) the conventional covariance analysis and (b) a parallel covariance analysis using estimated true pretest scores as the covariate. In addition, parallel statistics are given for two additional treatment pairs under Part II of this table. These pairs were selected because they did not satisfy the proposed regression criteria and because the members of each of these pairs differed markedly in adjusted means as estimated by the conventional covariance analysis. It can be seen that for each of the first 6 pairs the conventional covariance analysis provided a directionally correct but conservative test of the effect. For each pair the difference in the adjusted means, and in the F-ratios, was smaller for the conventional than for the true-score analysis. In contrast, for the two pairs of fields not meeting the proposed regression criteria (Part II) the conventional analysis led to spuriously high estimates of the differences in adjusted means and in the F-ratios. The analysis shown in Table D-1 thus provides a clear confirmation of the non-spurious character of comparisons meeting the proposed regression criteria, and at the same time a demonstration that test comparisons not meeting the criteria may be spuriously inflated.

In order to provide a still more stringent test of the formulation, a parallel analysis was performed on the college press scale showing the lowest overall correspondence in adjusted means from conventional and true-score covariance analyses. In Table 17 of Chapter III it may be

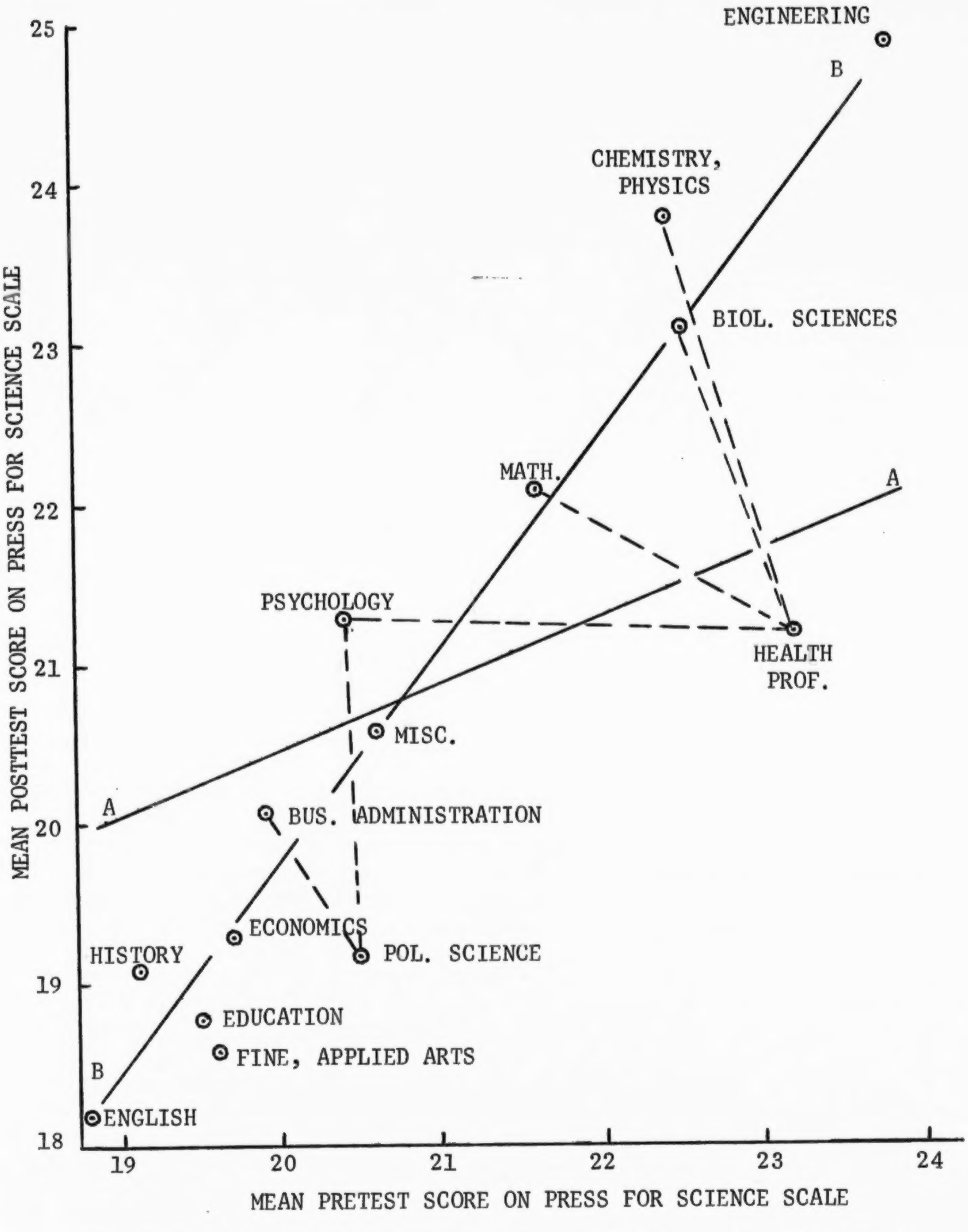


Fig. D-4. Contrasts between the Internal Regression Slope and Selected Paired-Treatment Slopes

TABLE D-1

Comparisons of Adjusted Means Obtained from Conventional and True-Score Covariance Analyses on Faculty Press for Science Scores (655 men classified in 14 fields of study)

		Comparisons of Statistics[a]					
		Adjusted posttest means		Difference in post-test means		F-ratio	
Fields Compared	N	C	T	C	T	C	T
I. Non-Spurious C Comparisons							
Psychology	34	21.40	21.50	2.12	2.16	11.36**	11.49**
Political Science	44	19.28	19.34				
Chemistry or Physics	38	23.15	22.67	2.96	3.19	5.09*	5.77*
Health Professions	5	20.19	19.48				
Biological Sciences	57	22.37	21.86	2.18	2.38	2.86	3.32
Health Professions	5	20.19	19.48				
Business Administration	111	20.42	20.66	1.14	1.32	5.34*	6.97*
Political Science	44	19.28	19.34				
Mathematics, Statistics	24	21.72	21.46	1.53	1.98	1.27	2.07
Health Professions	5	20.19	19.48				
Psychology	34	21.40	21.49	1.21	2.01	.84	2.26
Health Professions	5	20.19	19.48				
II. Potentially Spurious C Comparisons							
Engineering	41	23.60	22.72	4.67	3.24	52.11**	24.44**
English	32	18.93	19.48				
Chemistry, Physics	38	23.15	22.67	4.09	3.28	25.86**	16.21**
Fine, Applied Arts	17	19.06	19.39				

[a] C in this table designates a statistic from the conventional covariance analysis using fallible pretest scores as the covariate, while T designates a statistic from the covariance analysis using estimated true pretest scores as the covariate. The F-ratios given are the ratios for evaluating the significance of the difference in the given pair of adjusted means, and each has been calculated by the method using the average effective error per unit described in Chapter III. The average effective error per unit for the conventional analysis of covariance on this scale was 7.61, as compared with a value of 7.81 for the true-score analysis. Degrees of freedom for the given F-ratios are 1 and 640.

*$p < .05$

**$p < .01$

seen that the lowest correlation (.452) between the adjusted means based upon the two types of analyses was found on the scale, Student Press for Vocationalism. As inspection of the bivariate plot of means for this scale (similar to Figure D-4) revealed that there were 5 pairs of fields both meeting the regression criteria and showing relatively large differences in adjusted means based upon the fallible covariance analysis. In addition, two pairs of fields showing large differences in adjusted means but not satisfying the regression criteria were selected, as in the preceding example. The former are listed in Part I, and the latter in Part II, of Table D-2. It can be seen that without exception the comparisons satisfying the criteria provided directionally correct and conservative estimates of effects, while the 2 pairs not satisfying the criteria each yielded spuriously high estimates of effects. Thus the more stringent examination in Table D-2 nicely corroborated the results on the earlier press scale.

The argument presented suggests that when a reliability estimate of the covariate is not available, one may nonetheless infer differential effects for pairs of treatments which (a) satisfy the proposed regression criteria, and (b) yield significant F-ratios based upon adjusted means derived from conventional covariance analysis.[1] In rejecting the hypothesis of differential effects for all pairs of treatments not meeting these two conditions one is using an extremely conservative test of effects. For example, on the basis of this rule the differences between treatments in Part II of Tables D-1 and D-2 would be rejected as potentially spurious, even though the true-score analysis indicates that there are genuine (albeit smaller) differences between the given pairs of treatments. Nonetheless, it can be argued that a conservative test is better than no test at all.

Summary

The use of conventional covariance analysis is hazardous when subjects have not been assigned randomly to treatment groups. Comparisons are reported between results of conventional covariance analyses and those obtained from parallel analyses in which appropriate corrections were made to take account of errors of measurement on the covariate. The principle of contrasting external and internal regressions is discussed, and is extended to multiple group comparisons. Certain conditions were defined under which the test of the significance of the difference between pairs of adjusted means provided by conventional covariance analysis provides a directionally correct and conservative estimate of quasi-experimental effects.

---

[1] Throughout the analyses reported at the end of Chapter III the conventional overall significance test was inspected first, and if it did not meet the .05 significance level the relevant hypotheses were regarded as rejected. In the discussion above it is assumed that this third condition is also satisfied.

TABLE D-2

Comparisons of Adjusted Means Obtained from Conventional and True-Score Covariance Analyses on Student Press for Vocationalism Scores (655 men classified in 14 fields of study)

		Comparisons of Statistics[a]					
		Adjusted posttest means		Difference in post-test means		F-ratio	
Fields Compared	N	C	T	C	T	C	T
	I. Non-Spurious C Comparisons						
Chemistry, Physics	38	19.57	20.38	1.36	2.43	3.97*	12.38**
Biological Sciences	57	18.21	17.95				
Math., Statistics	24	19.75	20.29	1.54	2.34	3.74	8.42**
Biological Sciences	57	18.21	17.95				
Chemistry, Physics	38	19.57	20.38	1.97	2.00	6.44*	6.47*
English	32	17.60	18.38				
Chemistry, Physics	38	19.57	20.38	1.39	1.54	3.73	4.46*
History	43	18.18	18.84				
Engineering	41	20.41	19.93	1.07	2.47	.48	2.51
Health Professions	5	19.34	17.46				
	II. Potentially Spurious C Comparisons						
Engineering	41	20.43	19.93	2.22	1.98	11.10**	8.61**
Biological Sciences	57	18.21	17.95				
Engineering	41	20.43	19.93	2.83	1.55	13.77**	4.03*
English	32	17.60	18.38				

[a] See footnote a, Table D-1. The average effective errors per unit for the fallible and true-score analyses were 10.58 and 10.84, respectively.

*$p < .05$

**$p < .01$

APPENDIX E

Weighted, Linear Combinations for Predicting Entry and Aspiration Criterion Scores

The columns of Table E-1 represent each of the four linear combinations using more than one predictor, but less than the complete set of available predictors. The entries in this table show the weights used in deriving the composite scores. For example, the table shows that the predicted entry criterion scores for men were based upon predictors a, b, d, e, h, k, o, p, and r, using the weights shown in column 1.

TABLE E-1

Weights Used in Deriving Predicting Criterion Scores

Predictor from 1965 survey (as coded on questionnaire)[a]	Entry Criterion		Aspiration Criterion	
	Men (1)	Women (2)	Men (3)	Women (4)
a-Initial level of degree aspirations	.141	.102	.389	.372
b-Number of close friends planning graduate study	-.026	-.050	-.031	
c-Reported rank in high school graduating class		-.028		
d-Grade-point average	-.067		-.048	
e-Estimate of own ability to successfully pursue graduate study	.035		.051	.116
f-Father's occupational level		-.015		
g-Father's educational level			.017	
h-Mother's educational level	.026			
i-Scale score: Faculty enthusiasm			.006	
j-Scale score: Faculty press for vocationalism		-.120		
k-Scale score: Faculty evaluation of ability	.001			
l-Scale score: Faculty press for advanced training		.018		.011

TABLE E-1--Continued

Predictor from 1965 survey (as coded on questionnaire)[a]	Entry Criterion Men (1)	Entry Criterion Women (2)	Aspiration Criterion Men (3)	Aspiration Criterion Women (4)
m-Scale score: Faculty adequacy as positive role models				.005
n-Scale score: Faculty affiliation		.003		
o-Scale score: Student press for estheticism	.003	.003		.004
p-Scale score: Student press for advanced training	.013		.009	
q-Scale score: Student press for science			.015	.008
r-Scale score: Student opposition to faculty influence	-.002			
s-Scale score: Student press for intellectualism			.010	.014
Number of predictors used in given composite score	9	8	9	7

[a] In order to interpret the signs for weights, the reader should consult the 1965 survey questionnaire shown in Appendix B. For example, in column 1 grade-point average had a negative weight because (as the questionnaire shows) code numbers of low numerical value were assigned to higher grade-point averages.

APPENDIX F

The purpose of this appendix is twofold: first, to describe, and justify, departures from the plan of analysis initially described in the project proposal; and, second, to report additional analyses which supplement those presented in Chapter V.

First, it was decided to substitute partial correlation coefficients for the residual (part) correlations initially described. DuBois (16) has shown that the partial correlation is a product-moment correlation between two sets of residuals, from both of which variance associated with the same set of independent variates has been eliminated. In contrast, the part correlation is a correlation between an unmodified variate and a single residual variate. However, preliminary analyses indicated that measures of initial status were substantially correlated with college press scores obtained in 1966 and 1967, and it was apparent that it was desirable to partial out variance in the press scale scores associated with differences in initial dispositions to seek advanced training. Thus, the partial correlation coefficients offered more highly controlled comparisons, and facilitated the interpretation of results. DuBois and Manning (17) have explored various methods of studying the relation of an independent variable to change, and recommend that either the partial correlation coefficient or the part correlation be used.

Second, the initial plan of analysis emphasized an examination of the effects upon part correlations of successively omitting one or more predictors from the multiple regression equations used to predict criterion scores. Such calculations were in fact performed for the partial correlation coefficients, but are not reported in Chapter V. It was initially argued that such effects might be useful in ruling out the hypothesis that failures to control one or more relevant predictors had led to the observed correlations. However, the fact that the partial correlations varied slightly according to the number of predictors held constant can also be accounted for on the basis of the increasing reliability of the predicted criterion scores as the number of predictors increased. Moreover, the fact that 34 predictors were held constant in the analyses reported in Chapter V makes it unlikely that these correlations would be affected by the addition of one or two predictors. Tables F-1 and F-2 show that when only a single predictor (initial degree aspiration) is held constant, the partial correlations tend to be spuriously high. However, the magnitudes of the partial correlation coefficients did not vary appreciably according to whether 7, 8, or 9 predictors, [redacted]r all 34 predictors, were held constant.

Finally, one minor departure consisted in abandoning the attempt to study direction of causation by the cross-lagged panel correlation method described by Campbell (11). Two difficulties were encountered which indicated that even if such correlations were computed there would still remain formidable problems of interpretation. First Rozelle and Campbell (40)have recently shown that the proposed criterion regarding cross-lagged panel correlations does not in fact lead to the simple choice of one causal direction over the other, as originally supposed (11). Second, asymmetry in the time referents of the measures of students and of college environments made it difficult to apply the method. For example, the college press reports collected on each survey were retrospective in time reference, and presumably referred to events during the preceding academic year. In contrast, the measures of degree aspirations were status reports, and presumably described the respondent's dispositions at the time the survey questionnaire was completed.

TABLE F-1

Partial Correlations between College Press Scores and Criterion Scores
Holding Constant Different Numbers of Predictors (Men)

Press Scale	Entry Criterion[a]						Aspiration Criterion					
	1966 Press Scores			1967 Press Scores			1966 Press Scores			1967 Press Scores		
	Predictors used in predicting criterion			Predictors used in predicting criterion			Predictors used in predicting criterion			Predictors used in predicting criterion		
	1	9	34	1	9	34	1	9	34	1	9	34
1	08	02	04	09	02	04	10	03	04	19	11	12
2	08	03	05	12	06	07	-01	-06	-04	06	00	02
3	02	03	04	-02	00	00	-02	-04	-01	-01	-02	00
4	06	00	03	14	08	10	00	-05	-04	09	03	04
5	-10	-06	-07	-08	-03	-03	-03	02	01	00	04	04
6	12	05	06	17	10	10	08	02	02	15	09	09
7	02	-04	01	05	00	03	02	01	00	10	07	06
8	07	02	03	06	-01	00	07	02	02	09	02	02
9	11	07	04	06	01	00	17	11	11	10	04	03
10	07	03	07	12	05	08	07	02	06	13	07	10
11	04	03	07	04	04	06	09	-01	02	06	02	05
12	08	03	05	12	06	08	03	-02	00	08	02	05
13	07	-03	-02	12	03	03	05	-02	03	09	02	01

TABLE F-1--Continued

	Entry						Aspiration					
	1966			1967			1966			1967		
Press Scale	1	9	34	1	9	34	1	9	34	1	9	34
14	11	00	00	13	05	06	07	00	-01	15	09	10
15	-06	00	-01	-10	-02	-03	-03	00	-02	-05	-01	-02
16	03	-06	-04	06	-02	-01	03	-05	-05	06	-02	-03
17	-11	-04	-04	-09	-03	-02	00	03	03	-02	00	00
18	22	09	10	24	11	12	21	09	09	22	10	10
19	16	07	06	15	06	06	17	05	05	14	02	03
20	-09	00	-02	-14	-05	-06	-08	00	-04	-13	-05	-08
21	11	-01	01	17	05	06	11	00	01	15	04	03
22	-01	02	02	-02	01	03	-04	-02	-02	-04	-02	-02
23	04	00	00	-04	-01	-02	-12	-09	-06	-10	-08	-05

[a] Data based upon scores of 655 men. Decimals and significance levels of partial correlation coefficients have been omitted.

TABLE F-2

Partial Correlations between College Press Scores and Criterion Scores Holding Constant Different Numbers of Predictors (Women)

	Entry Criterion[a]						Aspiration Criterion					
	1966 Press Scores			1967 Press Scores			1966 Press Scores			1967 Press Scores		
	Predictors used in predicting criterion			Predictors used in predicting criterion			Predictors used in predicting criterion			Predictors used in predicting criterion		
Press Scale	1	8	34	1	8	34	1	7	34	1	7	34
1	09	02	05	17	11	16	05	-01	01	13	08	09
2	07	02	02	21	15	17	-02	-08	-04	07	01	04
3	-02	02	02	03	07	07	-04	-05	-01	01	-01	02
4	10	03	05	20	12	13	07	01	03	15	10	10
5	-12	-06	-06	-19	-13	-13	-05	-03	-01	-09	-07	-04
6	14	09	09	22	17	16	08	03	05	20	15	16
7	08	02	04	14	07	09	07	01	02	09	04	04
8	12	05	04	20	14	13	02	-04	-02	13	07	08
9	02	00	01	09	06	07	02	-02	00	10	05	06
10	06	00	02	16	12	14	07	02	03	15	12	12
11	04	01	04	13	09	13	-02	-04	00	05	02	06
12	08	02	02	19	13	14	02	-04	-01	07	02	04
13	09	01	01	17	09	09	08	00	-01	17	10	09

TABLE F-2--Continued

Press Scale	Entry						Aspiration					
	1966			1967			1966			1967		
	1	8	34	1	8	34	1	7	34	1	7	34
14	08	07	04	09	05	03	03	-01	-03	06	01	01
15	-13	-06	-09	-13	-05	-08	-07	-04	-03	-06	-03	-03
16	07	02	03	06	00	01	06	-02	-02	07	00	01
17	02	02	04	-04	-05	-03	-07	-05	-04	00	01	02
18	17	09	09	18	11	12	12	04	03	14	07	08
19	09	04	03	09	04	02	06	-01	-02	07	-01	-01
20	-10	-04	-06	-08	-02	-04	-05	02	00	-09	-03	-04
21	14	07	10	10	03	05	11	01	01	14	04	04
22	04	03	01	-01	-02	-03	-07	-06	-04	-08	-06	-04
23	00	00	04	-02	-02	01	01	-02	01	-04	-04	-02

[a] Data based on responses of 523 women. Decimals and significance levels of partial correlation coefficients have been omitted.

OE 6000 (REV. 9-66)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF EDUCATION

ERIC REPORT RESUME

(TOP)

ERIC ACCESSION NO.				
CLEARINGHOUSE ACCESSION NUMBER	RESUME DATE 9-30-68	P.A.	T.A.	

IS DOCUMENT COPYRIGHTED? YES ☐ NO ☒
ERIC REPRODUCTION RELEASE? YES ☒ NO ☐

TITLE
The Effects of College Environments on Students' Decisions to Attend Graduate School

PERSONAL AUTHOR(S)
Thistlethwaite, Donald L.

INSTITUTION (SOURCE)
Vanderbilt University, Nashville, Tenn., Department of Psychology

SOURCE CODE

REPORT/SERIES NO.

OTHER SOURCE

SOURCE CODE

OTHER REPORT NO.

OTHER SOURCE

SOURCE CODE

OTHER REPORT NO.

PUB'L. DATE Sept. - 30 - 68

CONTRACT/GRANT NUMBER OE 6-10-017

PAGINATION, ETC.
155 p.

RETRIEVAL TERMS
Attitudes toward Advanced Training; Change Agents; Changing Attitudes; College Environments; College Faculty; College Students; Environmental Influences; Graduate Study; Student Attitudes; Units of Study (Subject Fields).

IDENTIFIERS

ABSTRACT

Effects of college environments upon student attitudes toward pursuing advanced graduate or professional study were investigated. Subjects were 1,178 college students enrolled in 50 college and universities, and were members of the entering college class of 1963. Survey responses of panel members to a standard set of 23 college press scales were obtained at the completion of the sophomore, junior, and senior years. Procedures provided means of studying effects upon perceived college environments and upon aspirations and values of students of entering a major field of study, the degree to which aspirations and values changed concomitantly with changes in perceived values and expectations of teachers and peers, and the effects of college environments and experiences upon decisions to enter graduate school immediately after college graduation. Tests confirmed the hypotheses that desire to pursue graduate study was strengthened by achieving good rapport with college teachers during the senior year, exposure to peers exerting press for advanced training, talking with faculty members, students, and parents about graduate study, winning recognition for academic achievement in college, and by undergraduate research participation. Alternative methods of controlling errors of measurement in assessing initial status are discussed, and different criteria for assessing impacts of college environments upon student attitudes are evaluated.

OE 6000 (Rev. 9-66)

INSTRUCTIONS FOR COMPLETING ERIC REPORT RESUME

The resume is used to identify summary data and information about each document acquired, processed, and stored within the ERIC system. In addition to serving as a permanent record of the document in the collection, the resume is also a means of dissemination. All fields of the form must be completed in the allotted spaces, but inapplicable fields should be left blank. The following instructions are keyed to the line numbers appearing in the left margin of the form:

TOP LINE. ERIC Accession No. Leave blank. A permanent ED number will be assigned to each resume and its corresponding document as they are processed into the ERIC system.

LINE 001. Clearinghouse Accession No. For use only by ERIC Clearinghouses. Enter the alpha code and 6-digit document number.

Resume Date. In numeric form, enter month, day, and year that resume is completed. *(Example: 07 14 66)*

P.A. Leave blank.

T.A. Leave blank.

Copyright. Check appropriate block to denote presence of copyrighted material within the document.

ERIC Reproduction Release. Check appropriate block to indicate that ERIC has permission to reproduce the document and its resume form.

LINES 100-103. Title. Enter the complete document title, including subtitles if they add significant information. Where applicable, also enter volume number or part number, and the type of document *(Final Report, Interim Report, Thesis, etc.)*.

LINE 200. Personal Author(s). Enter personal author(s), last name first. *(Example: Doe, John J.)* If two authors are given, enter both. *(Example: Doe, John J. Smith, Ted)*. If there are three or more authors, list only one followed by "and others."

LINE 300. Institution *(Source)*. Enter the name of the organization which originated the report. Include the address *(city and State)* and the subordinate unit of the organization. *(Example: Harvard Univ., Cambridge, Mass., School of Education.)*

Source Code. Leave blank.

LINE 310. Report/Series No. Enter any unique number assigned to the document by the institutional source. *(Example: SC-1234)*

LINE 320. Other Source. Use only when a second source is associated with the document. Follow instructions for Line 300 above.

Source Code. Leave blank.

LINE 330. Other Report No. Enter document number assigned by the second source.

LINE 340. Other Source. Use only when a third source is associated with the document. Follow instructions for Line 300 above.

Source Code. Leave blank.

LINE 350. Other Report No. Enter document number assigned by the third source.

LINE 400. Publication Date. Enter the day, month, and year of the document. *(Example: 12 Jun 66)*

Contract/Grant Number. Applicable only for documents generated from research sponsored by the U.S. Office of Education. Enter appropriate contract or grant number and its prefix. *(Example: OEC-1-6-061234-0033)*

LINES 500-501. Pagination, etc. Enter the total number of pages of the document, including illustrations and appendixes. *(Example: 115p.)* USE THIS SPACE FOR ADDITIONAL INFORMATION PERTINENT TO THE DOCUMENT, such as publisher, journal citation, and other contract numbers.

LINES 600-606. Retrieval Terms. Enter the important subject terms *(descriptors)* which, taken as a group, adequately describe the contents of the document.

LINE 607. Identifiers. Enter any additional important terms, more specific than descriptors, such as trade names, equipment model names and numbers, organization and project names, discussed in the document.

LINES 800-822. Abstract. Enter an informative abstract of the document. Its style and content must be suitable for public announcement and dissemination.

U.S. GOVERNMENT PRINTING OFFICE : 1966 O—231-551